POOR LEGIBILITY

PORTIONS OF THIS DOCUMENT MAY BE UNREADABLE, DUE TO THE QUALITY OF THE ORIGINAL

2411

NUS CORPORATION
1927 LAKESIDE PARKWAY
SUITE 614
TUCKER, GEORGIA 30084
404-938-7710

SISB/SAS
RECEIVED
JUL 27 1990
EPA - REGION IV
ATLANTA, GA

C586-7-0-208

July 27, 1990

Mr. A.R. Hanke
Waste Programs Branch
Waste Management Division
Environmental Protection Agency
345 Courtland Street, N. E.
Atlanta, Georgia 30365

Date: Aug 31, 1990
Site Disposition: NFRAP
EPA Project Manager: [illegible]

Subject: Screening Site Inspection, Phase I
A.G. Products, Inc.
Ft. Lauderdale, Broward County, Florida
EPA ID No. FLD981029697
TDD No. F4-9002-16

Dear Mr. Hanke:

FIT 4 conducted a Phase I Screening Site Inspection at A.G. Products, Inc. in Ft. Lauderdale, Broward County, Florida. The Phase I assessment included a review of EPA and state file material, completion of a target survey, and a drive-by reconnaissance of the facility.

A.G. Products was located at 810 NW 57th Court prior to 1983. It is presently located at 4074 NE 7th Ave., Ft. Lauderdale, Florida (Ref. 1). The facility at 810 NW 57th Court is presently vacant and available for rent (Ref. 2). While A.G. Products owned and operated this facility, detergent components were blended, packaged, and sold in 55-gallon containers (Ref. 1). According to the tax assessor's office, the property at 810 NW 57th Court is now owned by Knight J. Perry, P.O. Box 11338, Ft. Lauderdale, Florida, (Ref. 2).

A.G. Products blended biodegradable materials which include nonionic surfactants (Shell-neoda 91-8), an emulsifier (Tridox-100), sodium laurel sulfate, di-ethyl coconutamid, and tri-sodium phosphate. This process did not generate any waste sludge; all rinse solutions were used as components for the next batch. Scrap drums were picked up by Southern Drum for recycling (Ref. 1). A.G. Products was cited by the Broward County Environment Quality Control Board (BCEQCB) in 1981 for allowing rinse water to run out onto the paved surface of the rear yard (Refs. 1, 3).

This area is in the Atlantic Coastal Ridge region of the Coastal Plain Physiographic Province (Ref. 4, plate-C). The area is a low, almost level plain with low ridges near the eastern shore. There are very few natural streams, but rather a network of canals which provide drainage. The average elevation for Broward County is 2 to 10 feet above mean sea level (amsl). Surface soils primarily consist of fine sands (Ref. 5, pp. 1, 44-45). Broward County is underlain by the Biscayne aquifer, which is a sole source aquifer (Refs. 6, p.3; 7). The climate is subtropical and humid with an average temperature of 75.4° F and a net annual rainfall of 13 inches (Refs. 5, pp. 1, 42; 8, pp. 43, 63). The 1-year, 24-hour rainfall is 4.5 inches (Ref. 9, p. 93).

The Biscayne aquifer is a highly permeable, wedge-shaped, unconfined aquifer that is about 300 feet thick in eastern Broward County and thins to the west. The Biscayne aquifer underlying the facility consists of the Pamlico Sand (quartz sand), Anastasia Formation (sandstone and limestone), the Key Largo Limestone (coralline reef rock), and the Tamiami Formation (limestones, sands, and marls) (Ref. 10; sheets 1, 2). The geologic formations present in the Executive Airport area are somewhat variable in thickness; the the stratigraphic sequence may vary. Recharge of the Biscayne aquifer is primarily through downward infiltration of rainfall. Infiltration of the rainwater is rapid due to the sandy soils along the coast as well as the presence of the solution cavities and conduits in the limestone. In southern Florida, at least one-fourth of the limestone rock is cavernous with interconnecting solution cavities generally filled with sand (Ref. 11, p. 133). The water table slopes eastward toward the coast; however, locally, the direction of flow may be influenced by drainage canals and wellfields (Refs. 6, pp. 3, 15; 10, sheets 1, 2). Water table depth around the A.G. Products, Inc. facility is about 4 feet (Ref. 12, pp. 30, 31).

Wells completed in the aquifer average 80 to 100 feet below the landsurface (bls) and provide all the municipal water supplies for Broward County (Ref. 7). Transmissivity of the Biscayne aquifer ranges from 5.4×10^4 to 4.0×10^5 ft^2/day, with storativities as high as 0.34 (Ref. 6, pp. 3, 8). Permeability ranges from 5×10^4 to 7×10^4 gpd/ft^2 (Ref. 12, p.39). The hydraulic conductivity of the Biscayne aquifer ranges from 1 cm/sec to 1×10^{-3} cm/sec (Ref. 13, p. 29).

Below the aquifer of concern is the Hawthorn Group, a confining unit consisting of sand and clay. It separates the Biscayne aquifer from the Floridan aquifer and is about 300 feet thick. The Floridan Aquifer System is a sequence of carbonate rock of generally high permeability, that is hydraulically connected in varying degrees. It consists of an upper and lower aquifer with a middle confining unit. The aquifer is about 1,500 feet thick in this area and is unused as a drinking water source due to its high salinity (Refs. 14, pp. 4, 5; 15, pp. A7, A8).

Most residences within 4 miles of the facility are served by various municipal wells. The BCUD 1B, the nearest municipal wellfield, serves 3,397 connections and is located 0.8 mile northeast of the facility. The Ft. Lauderdale Wellfield, which sells water to Oakland Park and Wilton Manor, serves a combined total of 63,200 connections and is located 2.7 miles west of the facility. Pompano Beach has two wellfields located 2.5 miles northwest and 3.5 miles northeast of the facility. These wellfields combine their water to serve 16,900 connections. Broadview has a wellfield located 3.3 miles west of the facility and serves 2,185 connections. BCUD 1A has a wellfield located 3.6 miles southwest and serves 10,843 connections (Refs. 7, 16).

Surface water runoff from the facility flows into storm drains located in front and behind the facility (Ref. 2). According to the Ft. Lauderdale Water Works, these storm drains or dry wells allow water to seep back into the ground (Ref. 17).

Land uses within 4 miles of the facility are residential, commercial, and industrial. The nearest residence is located approximately 1,100 feet southwest of the facility. The nearest school is the North Andrews Elementary School located approximately 3,000 feet east of the facility. The facility is not fenced; therefore, it is accessible to the public (Ref. 2). According to the 1980 population census, approximately 11,403 people live within I mile of the facility, and 202,467 people live within 4 miles (Ref. 18).

Several endangered and threatened species may be found within 4 miles of the A.G. Products facility. The threatened (federally designated) eastern indigo snake (Drymarchon corais couper) is found in an area 1.5 miles west of the facility and in the Fern Forest Nature Center 3.2 miles to the northwest (Refs. 16; 19; 20; 21, p. 3). The state-designated endangered hand adder's tongue fern (Ophiloglossum palmatum) is also found in the Fern Forest Nature Center (Refs. 20; 22, pp. 44, 45). The bird's-nest spleenwort (Asplenium serratum) and the star-scale fern (Pleopeltis revoluta), both state-designated endangered species, may also be found in the area (Ref. 22, pp. 9, 49, 50).

Based on the evaluation, no further remedial action planned is recommended for A.G. Products, Inc. If you have any comments or questions about this assessment, please contact me at NUS Corporation.

Very truly yours,

Margo E. Westmoreland
Project Manager

Approved:

Bob Donaghue

MEW/gwn

Enclosures

cc: Dorothy Rayfield

REFERENCES

1. Potential Hazardous Waste Site Preliminary Assessment (EPA Form 2070-12) and attachments for A.G. Products, Inc. Filed by David Troutman, E.C. Jordan Co., September 27, 1985.

2. NUS Corporation Field Logbook No. F4-2204 for A.G. Products, Inc., TDD No. F4-9002-16. Documentation of facility reconnaissance, May 24, 1990.

3. Facility Inspection Report for A.G. Products, Inc., May 6, 1981.

4. William A. White, The Geomorphology of the Florida Peninsula, Geological Bulletin No. 51 (Tallahassee, Florida: Bureau of Geology, 1970).

5. U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Broward County, Florida (July 1976).

6. H. Klein and J.E. Hull, Biscayne Aquifer, Southeast Florida, Water-Resources Investigations 78-107 (1978).

7. W. Smitherman, NUS Corporation, interoffice memorandum to K.D. Pass, Florida Section Leader, March 22, 1990. Subject: Municipal Water Systems for Broward County, Florida.

8. U.S. Department of Commerce, (Washington, D.C.: GPO, June 1968) Reprint: 1983, National Oceanic and Atmospheric Administration.

9. U.S. Department of Commerce, Rainfall Frequency Atlas of the United States, Technical Paper No. 40 (Washington, D.C.: GPO, 1961).

10. Carmen R. Causaras, Geology of the Surficial Aquifer System, Broward County, Florida, Water Resources Investigations Report 84-4068 (1985).

11. Garald G. Parker, and others, Water Resources of Southeastern Florida, Water-Supply Paper No. 1255 (1955).

12. Melvin C. Schroeder, Howard Klein, and Nevin D. Hoy, Biscayne Aquifer of Dade and Broward Counties, Report of Investigations No. 17 (1985).

13. R.A. Freeze and J.A. Cherry, Groundwater (Englewood Cliffs, N.J.: .Prentice-Hall, Inc., 1979).

14. Fredrick W. Meyer, Evaluation of Hydraulic Characteristics of a Deep Artesian Aquifer from Natural Water-Level Fluctuations, Miami, Florida, Report of Investigations No. 75 (1974).

15. Richard H. Johnston and Peter W. Bush, Summary of the Hydrology of the Floridan Aquifer System in Florida and in Parts of Georgia, South Carolina, and Alabama, Professional Paper 1403-A (1988).

16. U.S. Geological Survey 7.5 minute series Topographic Quadrangle Maps of Florida: Pompano Beach 1962 (Photorevised 1983), Fort Lauderdale North 1962 (PR 1983), Boca Raton 1962 (PR 1962), and West Dixie Bend 1962 (PR 1983), scale 1:24,000.

17. Hattie Platts, Ft. Lauderdale Water Works, telephone conversation with Margo Westmoreland, NUS Corporation, May 4, 1990. Subject: Storm drains located on and around the Ft. Lauderdale Executive Airport.

18. U.S. Environmental Protection Agency, Graphical Exposure Modeling System (GEMS) Data Base, compiled from U.S. Bureau of the Census data (1980).

19. Curtis Morgan, "Road Plan Saves Tortoise Habitat," The Miami Herald, April 26, 1990.

20. Paddy Cunningham, Fern Forest Nature Center, telephone conversation with William E. Vasser, NUS Corporation, May 3, 1990. Subject: Endangered and threatened species at the Fern Forest Nature Center.

21. Don A. Wood, Official Lists of Endangered and Potentially Endangered Fauna and Flora in Florida (Tallahassee, Florida: Florida Game and Fresh Water Fish Commission, 1988).

22. Daniel B. Ward, Rare and Endangered Biota of Florida, Plants Vol. 5 (Gainesville, Florida: University Presses of Florida, 1978).

SSI PHASE I
RECONNAISSANCE DOCUMENTATION CHECKLIST

Site Name: A.G. Products, Inc.

City, County, State: Ft. Lauderdale, Broward County, Flordia

EPA ID No.: FLD981029697

Person responsible for form: Margo Westmoreland

Date: 5/15/90

DESKTOP DATA COLLECTION

I. **Groundwater Use** (See project geologist for this information)

- Identify aquifer(s) of concern.

  Biscayne aquifer is the aquifer of concern.

- Identify any areas of karst terrain within the 4-mile site radius, and confining layers and hydraulic interconnections within 2 miles of the site.

  While the area within a 4-mile radius is not an area of karst terrain, there are solution cavities in the limestone.

II. **Surface Water Use**

- Identify uses along the 15-stream-mile surface water pathway (i.e. drinking water, fishing, irrigation, industrial).

  There are none.

- Identify any designated recreational areas, sensitive environments, and fisheries along the surface water pathway. Specify whether fishing is recreational, subsistence, or commercial. Information for smaller water bodies can be confirmed or obtained from local sources during the recon.

  There are none. Dry wells which allow water to drain directly into the ground are located in that area.

III. Sensitive Environments

- Identify any sensitive environments within 4 radial miles of the site (See Table 4-23 of the February 15, 1990 HRS Draft Final Rule, attached). Remember, sensitive environments are not limited to critical habitats.

  The eastern indigo snale (Drymarchon carais couperi) is found approximately 1.5 miles west of the facility. The Fern Forest Nature Center which containes the state-designated endangered land adder's tough fern (Ophiloglossum palmatum) is located approximately 3.2 miles northwest of the facility. The bird's-nest spleenwort (A splenium secratum) and stare-scale fern (Pleopeltis Bevoluta), both stated-designated endangered species, may also be found in the area.

DRIVE-BY RECONNAISSANCE DATA COLLECTION

I. Groundwater Use (This information can generally be obtained from local water departments, or city hall in rural areas).

- Identify on copies of topos the extent of all municipal systems and areas served by private wells within 4 miles of the site.

  See topographical map.

- Locate on copies of topos all municipal well locations in the site area, including any wells of a blended system >4 miles from site. Specify if water from these wells is partially or fully blended prior to or during distribution, and if any surface water intakes contribute to a blended system (whether or not they draw from the target sw pathway).

  See topographical map.

- Note the depth, pumpage, and population served for all municipal wells within the 4-mile site radius. Complete well survey forms.

BCUD - 1A	10,843 connections	Oakland Part 2,700 connections
BCUD - 1B	3,397 connections	Wilton Manor 4,500 connections
Broadview	2,185 connections	
Ft. Lauderdale	56,000 connections	

- Document other groundwater uses (e.g. irrigation, industrial).

II. Surface Water Use

- Identify on topos the 15-mile surface water pathway.

  Surface water drains into dry wells which allow water to seep in the ground. Therefore there is no surface water pathway.

- Identify and locate on topos any surface water intakes within 15 miles downstream of the site (to be obtained from local water department).

  There are none.

III. Site and Area Use Data Collection (May be obtained before or during recon)

- Describe any barriers to travel (e.g. rivers) within 1 mile of the site (consult topo).

  The Cypress Creek Canal is approximately 1 mile north of the facility.

- Describe population within the immediate site vicinity and within the 4-mile radius (e.g. sparsely populated rural areas, commercial/industrial areas, densely populated urban areas, etc.).

  The immediate site vicinity is a commercial and industrial area. The population of the area is a densely populated urban area.

- Obtain aerial photos of site and immediate vicinity whenever available (from county offices).

  Aerial photos are available in the state section office.

- Note if the facility is on sewers or septic tanks (consult water or public works department).

  The facility is on sewers.

- Obtain current property owner information from the county tax assessor's office.

  The property is owned by Knight J. Perry, P.O. Box 11388, Ft. Lauderdale, Fl. 33339.

HAZARD RANKING SYSTEM SCORING SUMMARY

FOR

A G PRODUCTS, INC.
EPA SITE NUMBER FLD981029697
FT LAUDERDALE
BROWARD COUNTY, FL
EPA REGION: 4

SCORE STATUS: IN PREPARATION

SCORED BY M. WESTMORELAND
OF NUS CORPORATION
ON 05/01/90

DATE OF THIS REPORT: 07/19/90
DATE OF LAST MODIFICATION: 07/19/90

GROUND WATER ROUTE SCORE	:	20.95
SURFACE WATER ROUTE SCORE	:	0.00
AIR ROUTE SCORE	:	0.00
MIGRATION SCORE	:	12.11

HRS GROUND WATER ROUTE SCORE

CATEGORY/FACTOR		RAW DATA	ASN. VALUE	SCORE
1. OBSERVED RELEASE		NO	0	0
2. ROUTE CHARACTERISTICS				
DEPTH TO WATER TABLE		4 FEET		
DEPTH TO BOTTOM OF WASTE		6 FEET		
DEPTH TO AQUIFER OF CONCERN		-2 FEET	3	6
PRECIPITATION		63.0 INCHES		
EVAPORATION		50.0 INCHES		
NET PRECIPITATION		13.0 INCHES	2	2
PERMEABILITY		1.0X10-3 CM/SEC	2	2
PHYSICAL STATE			3	3
TOTAL ROUTE CHARACTERISTICS SCORE:				13
3. CONTAINMENT			3	3
4. WASTE CHARACTERISTICS				
TOXICITY/PERSISTENCE:ASSIGNED VALUE,06				6
WASTE QUANTITY	CUBIC YDS	1		
	DRUMS	0		
	GALLONS	0		
	TONS	0		
	TOTAL	1 CU. YDS	1	1
TOTAL WASTE CHARACTERISTICS SCORE:				7
5. TARGETS				
GROUND WATER USE			3	9
DISTANCE TO NEAREST WELL		4224 FEET		
AND		MATRIX VALUE	35	35
TOTAL POPULATION SERVED		317289 PERSONS		
NUMBER OF HOUSES		0		
NUMBER OF PERSONS		0		
NUMBER OF CONNECTIONS		83497		
NUMBER OF IRRIGATED ACRES		0		
TOTAL TARGETS SCORE:				44

GROUND WATER ROUTE SCORE (Sgw) = 20.95

HRS SURFACE WATER ROUTE SCORE

CATEGORY/FACTOR	RAW DATA	ASN. VALUE	SCORE
1. OBSERVED RELEASE	NO	0	0
2. ROUTE CHARACTERISTICS			
SITE LOCATED IN SURFACE WATER	NO		
SITE WITHIN CLOSED BASIN	NO		
FACILITY SLOPE	0.0 %		
INTERVENING SLOPE	0.0 %	0	0
24-HOUR RAINFALL	4.5 INCHES	3	3
DISTANCE TO DOWN-SLOPE WATER	0 FEET	3	6
PHYSICAL STATE	3		3
TOTAL ROUTE CHARACTERISTICS SCORE:			12
3. CONTAINMENT	3		3
4. WASTE CHARACTERISTICS			
TOXICITY/PERSISTENCE:ASSIGNED VALUE,06			6
WASTE QUANTITY CUBIC YDS	1		
DRUMS	0		
GALLONS	0		
TONS	0		
TOTAL	1 CU. YDS	1	1
TOTAL WASTE CHARACTERISTICS SCORE:			7
5. TARGETS			
SURFACE WATER USE		0	0
DISTANCE TO SENSITIVE ENVIRONMENTS		0	0
COASTAL WETLANDS	NONE		
FRESH-WATER WETLANDS	NONE		
CRITICAL HABITAT	NONE		
DISTANCE TO STATIC WATER	> 3 MILES		
DISTANCE TO WATER SUPPLY INTAKE	> 3 MILES		
AND	MATRIX VALUE	0	0
TOTAL POPULATION SERVED	0		
NUMBER OF HOUSES	0		
NUMBER OF PERSONS	0		
NUMBER OF CONNECTIONS	0		
NUMBER OF IRRIGATED ACRES	0		
TOTAL TARGETS SCORE:			0

SURFACE WATER ROUTE SCORE (Ssw) = 0.00

HRS AIR ROUTE SCORE

CATEGORY/FACTOR	RAW DATA	ASN. VALUE	SCORE
1. OBSERVED RELEASE	NO	0	0

2. WASTE CHARACTERISTICS

REACTIVITY: MATRIX VALUE

INCOMPATIBILITY

TOXICITY

WASTE QUANTITY CUBIC YARDS
DRUMS
GALLONS
TONS

TOTAL

TOTAL WASTE CHARACTERISTICS SCORE: N/A

3. TARGETS

POPULATION WITHIN 4-MILE RADIUS
0 to 0.25 mile
0 to 0.50 mile
0 to 1.0 mile
0 to 4.0 miles

DISTANCE TO SENSITIVE ENVIRONMENTS
COASTAL WETLANDS
FRESH-WATER WETLANDS
CRITICAL HABITAT

DISTANCE TO LAND USES
COMMERCIAL/INDUSTRIAL
PARK/FOREST/RESIDENTIAL
AGRICULTURAL LAND
PRIME FARMLAND
HISTORIC SITE WITHIN VIEW?

TOTAL TARGETS SCORE: N/A

AIR ROUTE SCORE (Sa) = 0.00

HAZARD RANKING SYSTEM SCORING CALCULATIONS
FOR
SITE: A G PRODUCTS, INC.
AS OF 07/19/90

GROUND WATER ROUTE SCORE

ROUTE CHARACTERISTICS		13
CONTAINMENT	X	3
WASTE CHARACTERISTICS	X	7
TARGETS	X	44

= 12012 /57,330 X 100 = 20.95 = S_{gw}

SURFACE WATER ROUTE SCORE

ROUTE CHARACTERISTICS		12
CONTAINMENT	X	3
WASTE CHARACTERISTICS	X	7
TARGETS	X	0

= 0 /64,350 X 100 = 0.00 = S_{sw}

AIR ROUTE SCORE

OBSERVED RELEASE 0 /35,100 X 100 = 0.00 = S_{air}

SUMMARY OF MIGRATION SCORE CALCULATIONS

	S	S^2
GROUND WATER ROUTE SCORE (S_{gw})	20.95	438.90
SURFACE WATER ROUTE SCORE (S_{sw})	0.00	0.00
AIR ROUTE SCORE (S_{air})	0.00	0.00
$S^2_{gw} + S^2_{sw} + S^2_{air}$		438.90
$\sqrt{(S^2_{gw} + S^2_{sw} + S^2_{air})}$		20.95
$S_M = \sqrt{(S^2_{gw} + S^2_{sw} + S^2_{air})}/1.73$		12.11

HAZARD RANKING SYSTEM SCORING SUMMARY

FOR

A G PRODUCTS, INC.
EPA SITE NUMBER FLD981029697
FT LAUDERDALE
BROWARD COUNTY, FL
EPA REGION: 4

SCORE STATUS: IN PREPARATION

SCORED BY M. WESTMORELAND
OF NUS CORPORATION
ON 05/01/90

DATE OF THIS REPORT: 07/19/90
DATE OF LAST MODIFICATION: 07/19/90

GROUND WATER ROUTE SCORE	:	41.90
SURFACE WATER ROUTE SCORE	:	0.00
AIR ROUTE SCORE	:	0.00
MIGRATION SCORE	:	24.22

HRS GROUND WATER ROUTE SCORE

CATEGORY/FACTOR		RAW DATA	ASN. VALUE	SCORE
1. OBSERVED RELEASE		NO	0	0
2. ROUTE CHARACTERISTICS				
DEPTH TO WATER TABLE		4 FEET		
DEPTH TO BOTTOM OF WASTE		6 FEET		
DEPTH TO AQUIFER OF CONCERN		-2 FEET	3	6
PRECIPITATION		63.0 INCHES		
EVAPORATION		50.0 INCHES		
NET PRECIPITATION		13.0 INCHES	2	2
PERMEABILITY		1.0X10-3 CM/SEC	2	2
PHYSICAL STATE			3	3
TOTAL ROUTE CHARACTERISTICS SCORE:				13
3. CONTAINMENT			3	3
4. WASTE CHARACTERISTICS				
TOXICITY/PERSISTENCE:ASSIGNED VALUE,06				6
WASTE QUANTITY	CUBIC YDS	2501		
	DRUMS	0		
	GALLONS	0		
	TONS	0		
	TOTAL	2501 CU. YDS	8	8
TOTAL WASTE CHARACTERISTICS SCORE:				14
5. TARGETS				
GROUND WATER USE			3	9
DISTANCE TO NEAREST WELL		4224 FEET		
AND		MATRIX VALUE	35	35
TOTAL POPULATION SERVED		317289 PERSONS		
NUMBER OF HOUSES		0		
NUMBER OF PERSONS		0		
NUMBER OF CONNECTIONS		83497		
NUMBER OF IRRIGATED ACRES		0		
TOTAL TARGETS SCORE:				44

GROUND WATER ROUTE SCORE (Sgw) = 41.90

HRS SURFACE WATER ROUTE SCORE

CATEGORY/FACTOR	RAW DATA	ASN. VALUE	SCORE
1. OBSERVED RELEASE	NO	0	0
2. ROUTE CHARACTERISTICS			
SITE LOCATED IN SURFACE WATER	NO		
SITE WITHIN CLOSED BASIN	NO		
FACILITY SLOPE	0.0 %		
INTERVENING SLOPE	0.0 %	0	0
24-HOUR RAINFALL	4.5 INCHES	3	3
DISTANCE TO DOWN-SLOPE WATER	0 FEET	3	6
PHYSICAL STATE	3		3
TOTAL ROUTE CHARACTERISTICS SCORE:			12
3. CONTAINMENT	3		3
4. WASTE CHARACTERISTICS			
TOXICITY/PERSISTENCE:ASSIGNED VALUE,06			6
WASTE QUANTITY CUBIC YDS	2501		
DRUMS	0		
GALLONS	0		
TONS	0		
TOTAL	2501 CU. YDS	8	8
TOTAL WASTE CHARACTERISTICS SCORE:			14
5. TARGETS			
SURFACE WATER USE		0	0
DISTANCE TO SENSITIVE ENVIRONMENTS		0	0
COASTAL WETLANDS	NONE		
FRESH-WATER WETLANDS	NONE		
CRITICAL HABITAT	NONE		
DISTANCE TO STATIC WATER	> 3 MILES		
DISTANCE TO WATER SUPPLY INTAKE	> 3 MILES		
AND	MATRIX VALUE	0	0
TOTAL POPULATION SERVED	0		
NUMBER OF HOUSES	0		
NUMBER OF PERSONS	0		
NUMBER OF CONNECTIONS	0		
NUMBER OF IRRIGATED ACRES	0		
TOTAL TARGETS SCORE:			0

SURFACE WATER ROUTE SCORE (Ssw) = 0.00

HRS AIR ROUTE SCORE

CATEGORY/FACTOR	RAW DATA	ASN. VALUE	SCORE
1. OBSERVED RELEASE	NO	0	0

2. WASTE CHARACTERISTICS

REACTIVITY: MATRIX VALUE

INCOMPATIBILITY

TOXICITY

WASTE QUANTITY CUBIC YARDS
DRUMS
GALLONS
TONS

TOTAL

TOTAL WASTE CHARACTERISTICS SCORE: N/A

3. TARGETS

POPULATION WITHIN 4-MILE RADIUS
0 to 0.25 mile
0 to 0.50 mile
0 to 1.0 mile
0 to 4.0 miles

DISTANCE TO SENSITIVE ENVIRONMENTS
COASTAL WETLANDS
FRESH-WATER WETLANDS
CRITICAL HABITAT

DISTANCE TO LAND USES
COMMERCIAL/INDUSTRIAL
PARK/FOREST/RESIDENTIAL
AGRICULTURAL LAND
PRIME FARMLAND
HISTORIC SITE WITHIN VIEW?

TOTAL TARGETS SCORE: N/A

AIR ROUTE SCORE (Sa) = 0.00

HAZARD RANKING SYSTEM SCORING CALCULATIONS
FOR
SITE: A G PRODUCTS, INC.
AS OF 07/19/90

GROUND WATER ROUTE SCORE

ROUTE CHARACTERISTICS		13
CONTAINMENT	X	3
WASTE CHARACTERISTICS	X	14
TARGETS	X	44

= 24024 /57,330 X 100 = 41.90 = S_{gw}

SURFACE WATER ROUTE SCORE

ROUTE CHARACTERISTICS		12
CONTAINMENT	X	3
WASTE CHARACTERISTICS	X	14
TARGETS	X	0

= 0 /64,350 X 100 = 0.00 = S_{sw}

AIR ROUTE SCORE

OBSERVED RELEASE 0 /35,100 X 100 = 0.00 = S_{air}

SUMMARY OF MIGRATION SCORE CALCULATIONS

	S	S^2
GROUND WATER ROUTE SCORE (S_{gw})	41.90	1755.61
SURFACE WATER ROUTE SCORE (S_{sw})	0.00	0.00
AIR ROUTE SCORE (S_{air})	0.00	0.00
$S^2_{gw} + S^2_{sw} + S^2_{air}$		1755.61
$\sqrt{(S^2_{gw} + S^2_{sw} + S^2_{air})}$		41.90
$S_M = \sqrt{(S^2_{gw} + S^2_{sw} + S^2_{air})}/1.73$		24.22

CERCLA ELIGIBILITY QUESTIONNAIRE

Site Name: A.G. Products, Inc.
City: Ft. Lauderdale, Broward Co. State: Florida
EPA ID Number: FLD981029697

I. CERCLA ELIGIBILITY

	Yes	No
Did the facility cease operations prior to November 19, 1980?	___	✓

If answer YES, STOP, facility is probably a CERCLA site.

If answer NO, Continue to Part II.

II. RCRA ELIGIBILITY

	Yes	No
Did the facility file a RCRA Part A application?	___	✓
If YES:		
1. Does the facility currently have interim status?	___	___
2. Did the facility withdraw its Part A application?	___	___
3. Is the facility a known or possible protective filer? (facility filed in error)	___	___
4. Type of facility: Generator_______ Transporter______ Recycler______ TSD (Treatment/Storage/Disposal)_______		
Does the facility have a RCRA operating or post closure permit?	___	___
Is the facility a late (after 11/19/80) or non-filer that has been identified by the EPA or the State? (facility did not know it needed to file under RCRA)	___	___

If all answers to questions in Part II are NO, STOP, the facility is a CERCLA eligible site.

If answer to #2 or #3 is YES, STOP, the facility is a CERCLA eligible site.

If answer #2 and #3 are NO and any OTHER answer is YES, site is RCRA, continue to Part III.

III. RCRA SITES ELIGIBLE FOR NPL

	Yes	No
Has the facility owner filed for bankruptcy under federal or state laws?	___	___
Has the facility lost RCRA authorization to operate or shown probable unwillingness to carry out corrective action?	___	___
Is the facility a TSD that converted to a generator, transporter or recycler facility after November 19, 1980?	___	___

Reference No. 1

A. G. PRODUCTS, INC.
AKA: ARMOUR GUARD PRODUCTS, INC.
FLD981029697
PRELIMINARY ASSESSMENT

A. SITE DESCRIPTION. A. G. Products, Inc. was located at 810 NW 57th Court, Ft. Lauderdale, Broward County, Florida. The facility blended detergent components and packages and sells the product in 55 gallon drums. The firm moved to 4074 NE 7th Ave., Ft. Lauderdale in 1983.

B. DESCRIPTION OF HAZARDOUS CONDITIONS, INCIDENTS AND PERMIT VIOLATIONS. Available information indicates that the process does not generate any waste sludges and all rinse solutions are used as solvents for the next batch. Scrap drums are picked-up by Southern Drum for recycling. The process materials include non-ionic surfactants (Shell-Neoda 91-8), an emulsifier (Trido x-100), sodium laurel sulfate, Di-ehtyl coconutamid and Tri-sodium phosphate. No hazardous incidents have been reported.

A 1981 site inspection by BCEQCB reported that the drainfield was not working and rinsewater from the operation was allowed to run onto the ground surface.

C. NATURE OF HAZARDOUS MATERIALS. The process materials are reportedly biodegradable.

D. ROUTES OF CONTAMINATION. The likelihood of contamination is remote due to the degradable nature of the wastes.

E. POSSIBLE AFFECTED POPULATION AND RESOURCES. Area residents are provided with drinking water from the city of Ft. Lauderdale Executive/Prospect municipal wellfield. The wellfield draws from the Biscayne aquifer which is a shallow, permeable, sole-source aquifer. The site is located within the zone of influence of the wellfield. However, due to the biodegradable nature of the materials utilized, it is unlikely that any contaminants released to the groundwater would have significant effect upon the Executive/Prospect municipal wellfield.

F. RECOMMENDATIONS AND JUSTIFICATIONS. Since the materials utilized were biodegradable the site does not pose a significant hazard to the population and resources. Therefore, a low priority for inspection is recommended.

EPA

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT
PART 1 - SITE INFORMATION AND ASSESSMENT

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
FL	D981029697

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)				02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER
A. G. Products, Inc. (AKA: Armour Guard Products, Inc.)				810 NW 57th Court

03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST
Ft. Lauderdale	FL	33309	Broward	011	017

09 COORDINATES LATITUDE	LONGITUDE
26 10 40.0	080 08 27.0

10 DIRECTIONS TO SITE (Starting from nearest public road)

Proceed north from the intersection of Oakland Park Blvd. and NE 6th Ave. in Oakland Park. Continue on NE 6th Avenue to NE 42nd Street and turn right onto NW 8th Ave. The site is on the left.

III. RESPONSIBLE PARTIES

01 OWNER (if known)			02 STREET (Business, mailing, residential)
A. G. Products, Inc.			4074 NE 7th Avenue

03 CITY	04 STATE	05 ZIP CODE	06 TELEPHONE NUMBER
Ft. Lauderdale	FL	33444	(305) 564-9001

07 OPERATOR (if known and different from owner)	08 STREET (Business, mailing, residential)
Vic Mecca	Same

09 CITY	10 STATE	11 ZIP CODE	12 TELEPHONE NUMBER
Same			( ) Same

13 TYPE OF OWNERSHIP (Check one)

☒ A. PRIVATE ☐ B. FEDERAL: ______ (Agency name) ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL

☐ F. OTHER: ______ (Specify) ☐ G. UNKNOWN

14 OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply)

☐ A. RCRA 3001 DATE RECEIVED: __/__/__ MONTH DAY YEAR ☐ B. UNCONTROLLED WASTE SITE (CERCLA 103 c) DATE RECEIVED: __/__/__ MONTH DAY YEAR ☒ C. NONE

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION

☒ YES DATE 08/19/82 (MONTH DAY YEAR)
☐ NO

See "Attachment A"

BY (Check all that apply) ☐ A. EPA ☐ B. EPA CONTRACTOR ☐ C. STATE ☐ D. OTHER CONTRACTOR ☒ E. LOCAL HEALTH OFFICIAL ☐ F. OTHER: ______ (Specify)

CONTRACTOR NAME(S): ______

02 SITE STATUS (Check one): ☒ A. ACTIVE ☐ B. INACTIVE ☐ C. UNKNOWN

03 YEARS OF OPERATION: Pre-1982 (BEGINNING YEAR) | Present (ENDING YEAR) ☐ UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED

The process materials utilized on-site are reportedly biodegradable and include non-ionic surfactant (Shell-Neoda 91-8), an emulsifier (Tridox-100), sodium laurel sulfate, bi-Ethyl coconutamid and Tri-sodium phosphate.

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION

Since the materials utilized are reportedly biodegradable, the site should not pose a significant hazard to the environment or population.

V. PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION (Check one. If high or medium is checked, complete Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Incidents)

☐ A. HIGH (Inspection required promptly) ☐ B. MEDIUM (Inspection required) ☒ C. LOW (Inspect on time available basis) ☐ D. NONE (No further action needed, complete current disposition form)

VI. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)		03 TELEPHONE NUMBER
Eric Nuzie Eric S. Nuzie	Florida DER		(904) 488-0190

04 PERSON RESPONSIBLE FOR ASSESSMENT	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NUMBER	08 DATE
David Troutman	N/A	E.C. Jordan Co.	(904) 656-1293	09/27/85

EPA FORM 2070-12 (7-81)

EN

EPA

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
FL	D 981029697

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☐ A. GROUNDWATER CONTAMINATION — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

Remote potential - Based upon available information, no hazardous wastes are handled on-site and the process materials are biodegradable.

01 ☐ B. SURFACE WATER CONTAMINATION — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

Remote potential - Based upon available information, no hazardous wastes are handled on-site and the process materials are biodegradable.

01 ☐ C. CONTAMINATION OF AIR — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

No potential.

01 ☐ D. FIRE/EXPLOSIVE CONDITIONS — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

Remote potential - On-site storage of propane gas could endanger workers and other nearby population.

01 ☐ E. DIRECT CONTACT — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

Remote potential - Based upon available information, no hazardous wastes are handled on-site and the process materials are biodegradable.

01 ☐ F. CONTAMINATION OF SOIL — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 AREA POTENTIALLY AFFECTED: ______ (Acres) 04 NARRATIVE DESCRIPTION

Remote potential- Based upon available information, no hazardous wastes are handled on-site and the process materials are biodegradable.

01 ☐ G. DRINKING WATER CONTAMINATION — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

Remote potential - Based upon available information, no hazardous wastes are handled on-site and the process materials are biodegradable.

01 ☐ H. WORKER EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 WORKERS POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

Remote potential - Based upon available information, no hazardous wastes are handled on-site and the process materials are biodegradable however, on-site storage of propane gas could endanger workers.

01 ☐ I. POPULATION EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

Remote potential - Based upon available information, no hazardous wastes are handled on-site and the process materials are biodegradable.

ATTACHMENT A
A.G. PRODUCTS, INC.
ON-SITE INSPECTIONS

DATE	AGENCY	SAMPLES	COMMENTS
8/27/85	E.C. Jordan Co. for FDER	No	Only problem detected was some on-site, covered drums in poor condition
8/19/82 to 4/30/81	BCEQCB	No	No problems detected.

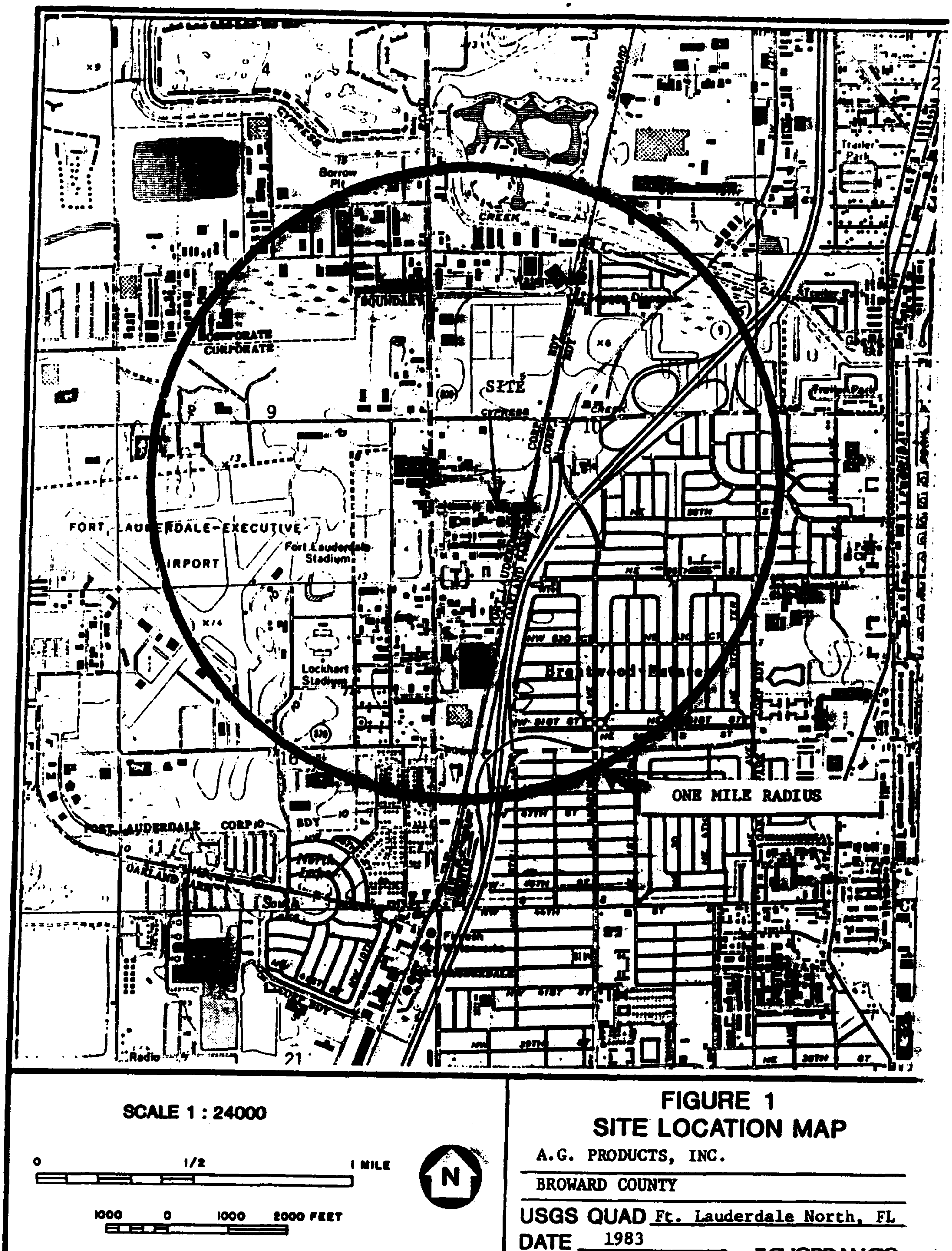


FIGURE 1
SITE LOCATION MAP

A.G. PRODUCTS, INC.

BROWARD COUNTY

USGS QUAD Ft. Lauderdale North, FL

DATE 1983

E.C.JORDAN CO.

REFERENCE LIST

1. Environmental Protection Agency, Federal Register, National Oil and Hazardous Substances Contingency Plan, Part V, July 16, 1982.

2. Farm Chemicals Handbook, Willoughby, OH; Meister Publishing Company, 1982.

3. Florida Department of Environmental Regulation, The Sites List, Summary Status Report, July 1, 1983 - June 30, 1984.

4. Florida Department of Environmental Regulation, 3012 Folder, 2600 Blairstone Road, Tallahassee, Florida. To be used for completion of Preliminary Assessment, Form 2070-12.

5. Florida Department of Natural Resources, Water Resources of Broward County, Report of Investigation No. 65, 1973.

6. Florida Division of Geology, Chemical Quality of Waters of Broward County, Florida, Report of Investigations No. 51, 1968.

7. Florida Geological Survey, Biscayne Aquifer of Dade and Broward Counties, Florida, Report of Investigation No. 17, 1958.

8. Florida Geological Survey, Groundwater Resources of the Oakland Park Area of Eastern Broward County, Florida, Report of Investigation No. 20, 1959.

9. Health and Safety Plan, Florida 3012 Program, E.C. Jordan Co., June 1984.

10. Healy, Henry G., 1977, Public Water Supplies of Selected Municipalities in Florida, 1975: U.S. Geological Survey, Water-Resources Investigations 77-53, p. 309.

11. NUS Project for Performance of Remedial Response Activities at Uncontrolled Hazardous Substance Facilities--Zone 1. NUS Corporation, Superfund Division.

12. NUS Training Manual, Project for Performance of Remedial Reponse Activities at Uncontrolled Hazardous Substance Facilities--Zone 1, NUS Corporation, Superfund Division.

13. Sax, N. Irving, Dangerous Properties of Industrial Materials, Sixth Edition, Van Nostrand Reinhold Co., 1984.

14. TLVs Threshold Limit Values for Chemical Substances in the Work Environment Adopted by ACGIH for 1983-84, American Conference of Governmental Industrial Hygienists, ISBN: 0-936712-45-7, 1983.

15. U.S. Geological Survey, Topographic Map, 1-24,000 Series.

16. Windholz, M., ed. The Merck Index, an Encyclopedia of Chemicals and Drugs, Rahway, NJ: Merck and Company, Inc., 1976.

Reference No. 2

"Rite in the Rain" - A unique All-Weather Writing Paper created to shed water and enhance the written image. It is widely used throughout the world for recording critical field data in all kinds of weather.

Available in a variety of standard and custom printed case-bound field books, loose leaf, spiral and stapled notebooks, multi-copy sets and computer papers.

"Rite in the Rain" All-Weather Writing Papers are also available in a wide selection of rolls and sheets for printing and photocopying.

a product of

J. L. DARLING CORPORATION
TACOMA, WA 98421-3696 USA

"Rite in the Rain"®

ALL-WEATHER
LEVEL
Notebook No. 311

22O[illegible]

AG P[illegible] Inc.
F4-[illegible]
Ft. La[illegible] Broward Co. FL
[illegible] [illegible]eland

LOGBOOK REQUIREMENTS
REVISED - NOVEMBER 29, 1988

NOTE: ALL LANGUAGE SHOULD BE FACTUAL AND OBJECTIVE

1. Record on front cover of the Logbook: TDD No., Site Name, Site Location, Project Manager.
2. All entries are made using ink. Draw a single line through errors. Initial and date corrections.
3. Statement of Work Plan, Study Plan, and Safety Plan discussion and distribution to field team with team members' signatures.
4. Record weather conditions and general site information.
5. Sign and date each page. Project Manager is to review and sign off on each logbook daily.
6. Document all calibration and pre-operational checks of equipment. Provide serial numbers of equipment used onsite.
7. Provide reference to Sampling Field Sheets for detailed sampling information.
8. Describe sampling locations <u>in detail</u> and document all changes from project planning documents.
9. Provide a site sketch with sample locations and photo locations.
10. Maintain photo log by completing the stamped information at the end of the logbook.
11. If no site representative is on hand to accept the receipt for samples, an entry to that effect must be placed in the logbook.
12. Record I.D. numbers of COC and receipt for sample forms used. Also record numbers of destroyed documents.
13. Complete SMO information in the space provided.

07/24/90
We the undersigned, have Read and understand the work plan for this phase of the site assessment.

Margo E. Westmoreland
Margo E. Westmoreland
Bob Tolford Bob Tolford

All entries will be made by me, Margo Westmoreland, and All photos will be described on page 48
MEW

04/24/90 Cloudy out

0915 ARRIVED AT the site location.

This building located At 810 NW 57th Court is a VACANT building.

This building is located in a commercial and industrial AREA.

There is A for Rent sign on the building

This facility is not fenced.

No emmision source is present

A drainage grate is located Approximately 10 ft across the street in front of the building.

-MGW

04/24/90

In the front of the building water appears to drain West into a drainage grate.

In the back of the building water appears to drain east into A drainage grate.

There is A dumpster located behind the building.

The Nearest building is Horner equipment approximately 10 ft ~~west~~ east of the facility.

The nearest Resident is Approximately 1100 feet Southwest of the facility.

The surrounding area Appears to be on A municipal water supply.

MGW

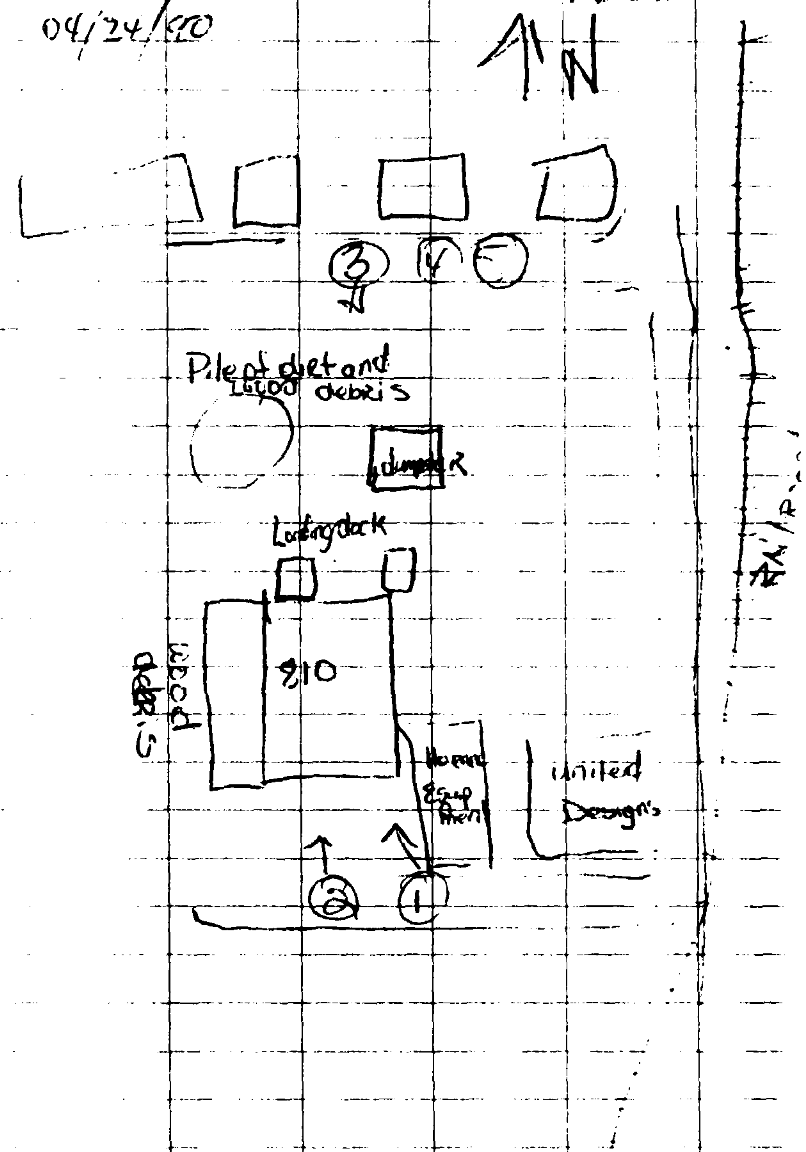
000004

04/24/90

The nearest school is the North Andrews Elementary School located 3,000 feet east of the facility.

-MSW

04/24/90



-MSW

000005

000006

04/25/90

1000 Arrived at the tax assessor office.

The property located at 810 NW 57th Court is owned by Knight J. Perry PO Box 11338, Ft Lauderdal, FL 33339.

MKW

000007

000048

F4-9002-16
04/24/90
0925 M. Westmoreland
3
North of the facility
the back of the facility

F4-9002-16
04/24/90
0920 M. Westmoreland
2
South of the facility
across the street
front of the facility

F4-9002-16
04/24/90
0920 M. Westmoreland
1
South of the facility
across the street
front of the facility

STANDARD SAMPLE CODES

Water Samples

PW - Private well
PB - Public (Municipal) Well
MW - Monitoring (Permanent) Well
TW - Temporary (Well Point) Well
IW - Industrial Well
SW - Surface Water
SP - Spring Water
LW - Leachate Water

Soil Samples

SS - Surface Soil
SB - Subsurface Soil
SZ - Saturation Zone
SD - Sediment
CS - Composite Soil
LS - Leachate Soil

OTHER CODES

AR - Air
SL - Sludge
WA - Waste
DR - Drum

QC - Quality Control
AQ - Aquatic (Biological)
TB - Trip Blank

For all samples that are to be analyzed by the in house FIT IV laboratory, the following deviation from the standard codes are to be used: The letter "F" (denoting FIT Lab Analysis) is to be inserted in front of the sample number.
Example: Standard Auto Sampling Investigation - Temporary Well Groundwater Sample - Number 08
Appropriate Code: SA-TW-F08

000046

FY-9002-16
04/24/90
0925
5
North of the facility
back of the facility.

FY-9002-16
04/24/90
0925
4
North of the bacility
back of the facility

000047

Time Out 1226 — Reference No. 3 — Zone 2

FACILITY INSPECTION REPORT

Source Armour Guard Chemical Co. Source No. 251

Potential Pollution Emission Pts. *(Problem)	Control Equipment(E)/Procedures(P)			
1. Yard Area	In Use E	Not In Use__	Effective ✓	Ineffective__
2.	In Use__	Not In Use__	Effective__	Ineffective__
3. Vats	In Use E	Not In Use__	Effective ✓	Ineffective__
4.	In Use__	Not In Use__	Effective__	Ineffective__
5. Storage area	In Use E	Not In Use__	Effective ✓	Ineffective__
6. (inside & outside)	In Use__	Not In Use__	Effective__	Ineffective__
7.	In Use__	Not In Use__	Effective__	Ineffective__
8. Rinse area	In Use P	Not In Use__	Effective__	Ineffective ✓

Comments: This is a division of "Fill-R-Up". Armour Guard blends & manufactures the soaps and waxes used in car-wash operations.

The operation as a whole is acceptable by our pollution control standards - with the exception of the rinse water being allowed to run out onto the paved surface of their rear yard. This rear yard is used for drum storage and car parking. Other than messy house keeping habits, I only gave a "verbal warning" regarding "industrial wastes to surface or ground waters".

The blending & mixing procedures here (with bio-degradable products) is quite simple - from containers - to vats - to containers for shipment. Due to the amounts of chemicals used (above average) I recommend a "C" or "D" frequency.

Person Contacted: John Ripenburgh Title Pres

Next Contact Date: 7/30/81 Inspector(s) J. Ray
"C" or "D" contact

OFFICE USE ONLY

Referred To: ☐ Air ☒ Wastewater Eng. Date: 5/6/81 REF.# ____

Warning Notice Issued: At Insp.____ From Office:____ Date ____

Citation Issued: At Insp.____ From Office:____ Date ____

PC 229
2-24-81 Rev.

Reference No. 4

STATE OF FLORIDA
DEPARTMENT OF NATURAL RESOURCES

BUREAU OF GEOLOGY
Robert O. Vernon, Chief

GEOLOGICAL BULLETIN NO. 51

THE GEOMORPHOLOGY OF THE FLORIDA PENINSULA

By
William A. White

Published for
BUREAU OF GEOLOGY
DIVISION OF INTERIOR RESOURCES
FLORIDA DEPARTMENT OF NATURAL RESOURCES

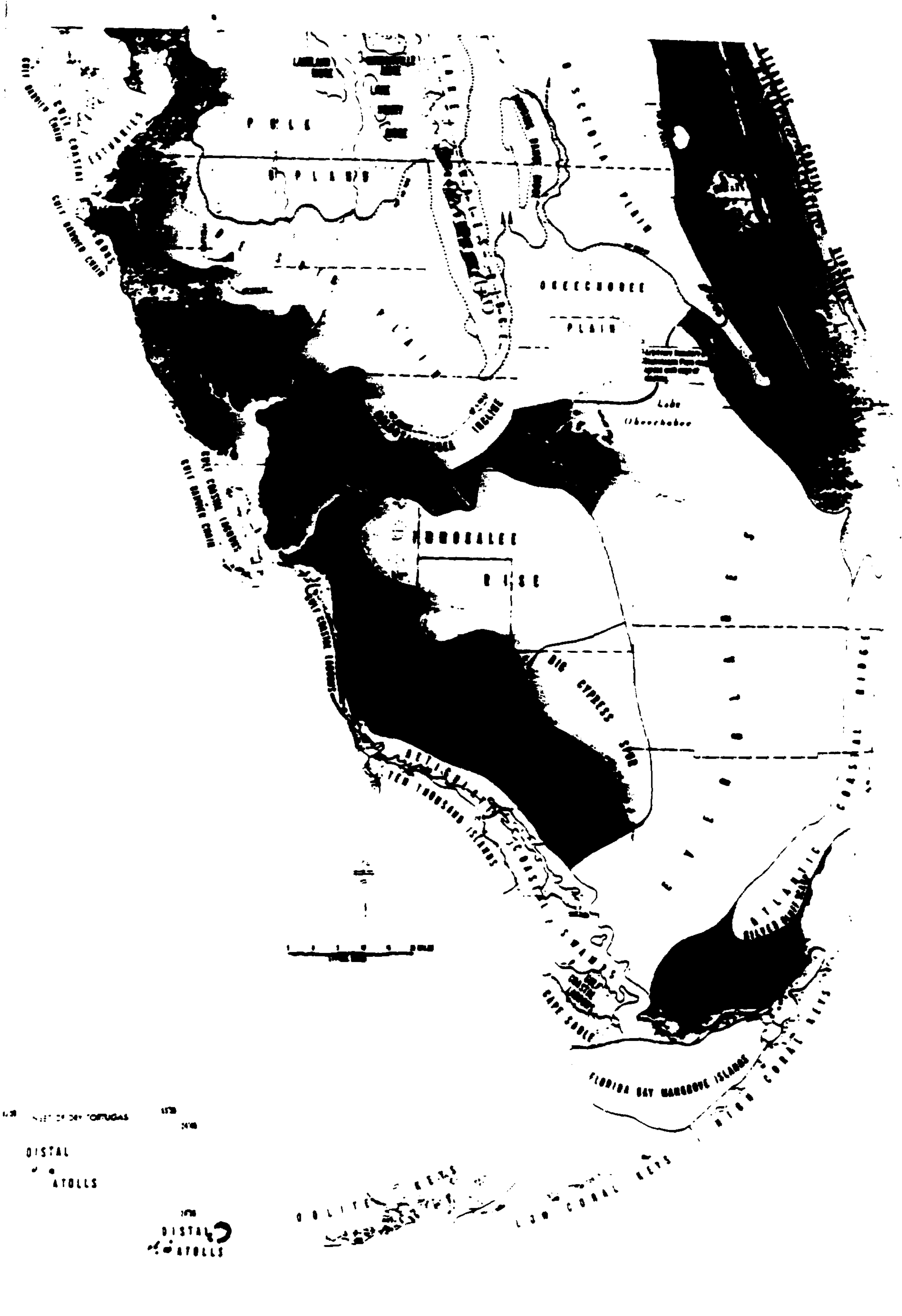
Tallahassee, Florida
1970

CONTENTS

Figure

DEPARTMENT of NATURAL RESOURCES
DIVISION of INTERIOR RESOURCES

prepared by BUREAU of GEOLOGY



I-C PHYSIOGRAPHIC MAP OF SOUTH PENINSULA FLORIDA

Reference No. 5

SOIL SURVEY OF

Broward County Area, Florida

United States Department of Agriculture
Soil Conservation Service
In cooperation with
University of Florida
Institute of Food and Agricultural Sciences
Agricultural Experiment Stations
Soil Science Department

Contents

Issued July 1976

SOIL SURVEY OF BROWARD COUNTY AREA, FLORIDA

BY ROBERT F. PENDLETON, HERSHEL D. DOLLAR, AND LLOYD LAW, JR.,
SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH UNIVERSITY OF FLORIDA, INSTITUTE OF FOOD AND AGRICULTURAL SCIENCES, AGRICULTURAL EXPERIMENT STATIONS, SOIL SCIENCE DEPARTMENT

BROWARD COUNTY AREA is in Broward County and the southeastern part of Florida (fig. 1). It

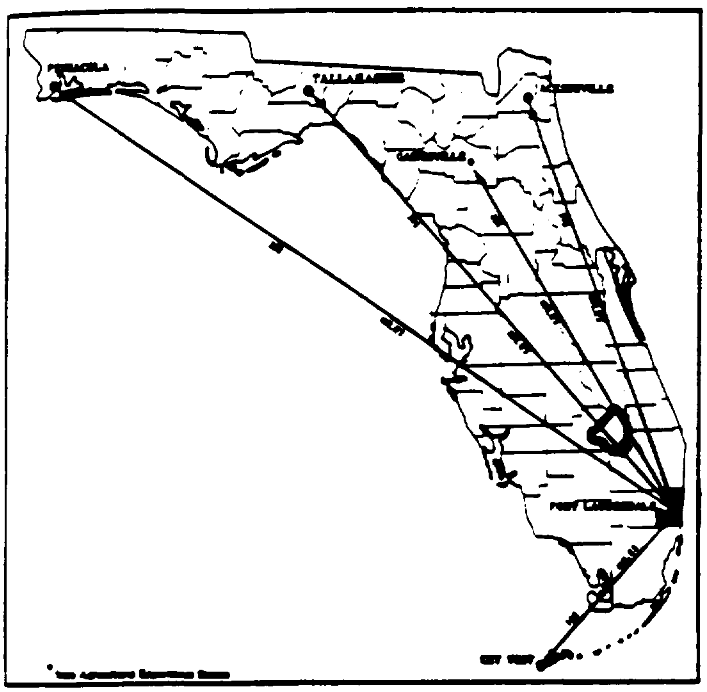


Figure 1.—**Location of Broward County Area in Florida.**

has a total land area of 189,273 acres or about 296 square miles. Fort Lauderdale is the county seat of Broward County. The survey area is bounded by Dade County on the south, a conservation area on the west, Palm Beach County on the north, and an area defined along Range line 42–43E to Atlantic Boulevard, west on Atlantic Boulevard to Powerline Road, south on Powerline Road to Oakland Park Boulevard, west on Oakland Park Boulevard to Sunshine Parkway, and south on the Sunshine Parkway to the Dade County line.

Most of the survey area is low, nearly level land at an elevation of 2 to 10 feet above sea level. Two sand ridges are in the area. One is a coastal ridge that extends from Palm Beach County and ends south of Pompano. The other is known as Pine Island and is west of Davie and north of Cooper City. This ridge consists of only about 400 acres but is at the highest elevation, 29 feet, in the Area. The average temperature is 75.4° F. Rainfall is abundant, but is unevenly distributed.

The county had a population of 620,000 people in 1970.[1] Almost all of the people live east of the conservation area.

Generally, farm activity has diminished, but some citrus crops, winter truck crops, and cattle are produced.

The Area is very popular with tourists and retired persons because of the warm climate in winter and the various available recreational facilities.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in the Broward County Area, where they are located, and how they can be used. The soil scientists went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes, the size and speed of streams, the kinds of native plants or crops, the kinds of rock, and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey.

Soils that have profiles almost alike make up a soil series. Except for different textures in the surface

[1] This figure is taken from statistical data of the U.S. Department of Commerce, Bureau of the Census.

cation exchange capacity and then multiplying by 100.

Organic matter was determined by a modification of the Walkley-Black wet-combustion method as outlined in procedure 6A1a. Total nitrogen was obtained by the semi-micro Kjeldahl method as shown in procedure 6B2a. Resistivity (ohm em) or an "R" value was obtained using a Model 100 Corrosion Tester. The corrosion potential or a "C" value that was obtained from the manufacturer's tables is directly related to the "R" value. The smaller the "C" value, the less the corrosion and the greater the expectancy of pipe life. Generally, C values range from 1 to 10, and pipe life ranges accordingly from 20 to 2 years.

Bulk density, hydraulic conductivity (saturated), and water retention at 0.10 and 0.33 bar were measured on 3 by 5.4 centimeter cylindrical (undisturbed) soil cores. Water retention at 15-bar suction was determined on disturbed or loose soil samples by procedure 4B2.

Water retention difference was calculated using the formula

$$\text{WRD (in/in)} = \frac{\frac{1}{3} - (\text{or } \frac{1}{10}) \text{ bar } \% - 15 - \text{bar } \%}{100}$$

x bulk density, moist. $\frac{1}{10}$ bar was used for sandy soils and $\frac{1}{3}$ bar for organic soils. Water retention difference is considered by many to closely approximate available water capacity.

Additional Facts About the Area

Soil is intimately associated with its environment. The interaction of all factors determines the overall behavior of a soil for a given use. This section discusses briefly the major factors of the environment other than those that affect the use and management of soils. The factors discussed are climate; transportation, markets, and farming; water supply and natural resources; and physiography and drainage.

Climate [10]

The climate of Broward County is characterized by long, warm, humid summers and mild winters. The moderating influence of the waters of the Atlantic on maximum temperatures in summer and minimum temperatures in winter is quite strong along the immediate coast but diminishes noticeably a few miles inland. The moderation of the coastal winter temperatures gives this section of the survey area a tropical climate (temperatures of coldest month higher than 64.4° F), while the rest is designated as humid subtropical.

Rainfall also has a much greater variation in an east-west direction than it has in a north-south direction. Precipitation occurs during all seasons but on the basis of mean monthly totals of precipitation, a rainy season of 5 months from June through October brings nearly 65 percent of the annual rainfall and a relatively dry season of 5 months from November through March produces only about 20 percent of the annual total. Average annual rainfall totals range from 60 inches along the coastal sections to nearly 64 inches a few miles inland, and then diminish to 50 inches along the western border of Broward County.

Most summer rainfall comes from showers and thunderstorms of short duration. They are sometimes heavy, with 2 or 3 inches of rain falling within a period of 1 to 2 hours. Day-long rains in summer are rare. When they occur, they are almost always associated with tropical storms. Winter and spring rains are not generally so intense as summer thundershowers. A 24-hour rainfall of almost 9 inches may be expected to occur sometime during the year in about 1 year in 10 on the average.

Hail falls occasionally in thunderstorms but the hailstones are generally small and seldom cause much damage. Fourteen tornadoes were reported in Broward County during the 12-year period 1959–71.

Temperature and precipitation data for the period 1962–71 are shown in table 17. The data recorded at the Fort Lauderdale Experiment Station are representative of weather conditions in the eastern section of Broward County, but away from the immediate influences of the Atlantic. Table 18 gives a comparison with other weather stations within Broward County. The Experiment Station is located 5 miles southwest of the Fort Lauderdale Post Office, while the Dixie Water Plant is within the city limits, 2 miles southwest of the Post Office. The Bahia Mar observations are taken at the Yacht Club on the ocean, 3 miles east of the Post Office. North New River Canal No. 2 is a weather station that collects rainfall data only. It is located on the northern border of the county, centered midway between its eastern and western boundaries.

Summer temperatures have few day-to-day variations, and temperatures as high as 98° F. are rare. In 45 years of record at the Dixie Water Plant, only one reading of 100° has been recorded. Twenty years of observation show a record high of 98° at the Experiment Station and 96° at Bahia Mar.

Winter minimum temperatures have considerable day-to-day variations due largely to periodic invasions of cold, dry air that has moved southward from Canada. At the Experiment Station, temperatures of 32° or below have been observed on only 11 days during the past 10 years. In 3 of the 10 years, no freezing temperatures have been observed. Data from stations run by the Federal-State Frost Warning Service show that in the 30-year period 1937–67, there were 25 nights on which the temperatures reached 32° or below the coast, and 75 nights inland along the western edge of Broward County. Calculations show that in the same period there were 100 hours with temperatures of 32° or below along the coast, increasing to 300 hours inland. The lowest temperature reported in the Fort Lauderdale area during the last 45 years was 28°. Table 19 gives the record of low temperatures at Davie, a Frost Warning Station located in the interior southeastern section of Broward County. This temperature record can be considered representative of the climate for truck farming in the eastern sections of the survey area.

[10] By JAMES T. BRADLEY, climatologist for Florida, National Weather Service, U.S. Department of Commerce. For convenience in presentation this section includes climate data for all of Broward County.

TABLE 19.—*Record of low temperatures*

[Period of

Temperature	Percent of seasons at or below various temperatures before—						
	November 20	December 10	December 30	January 19	February 18	March 10	March 30
°F							
36	0	23	57	87	100	100	100
32	0	13	33	57	77	83	83
28	0	0	7	17	33	33	33
26	0	0	7	7	17	17	17
24	0	0	0	0	3	3	3

Four airports are available for use—Fort Lauderdale-Hollywood International Airport, Fort Lauderdale Executive Airport, Pompano Beach Airport, and North Perry Airport. Only Fort Lauderdale International Airport has scheduled commercial airline flights. The other airports are mostly for private planes.

The largest state owned fresh-vegetable market in Florida is the Pompano State Farmers' Market. This market handles vegetables from the survey area and from the southern part of Palm Beach County. Most of the citrus is processed in other counties. More grapefruit is consumed than is produced in the county.

Not much farming was practiced in the Broward County Area before 1910. Drainage was established with the formation of the Napoleon B. Broward Drainage District. After drainage was established, citrus groves were planted between the New River and South New River Canals. Most of the winter vegetable crops were grown in the same area, but planting soon spread primarily to the north as the area was developed (*9*). According to the 1950 Census of Agriculture, approximately 700 farms and 45 dairies were in Broward County in 1950. By 1969, the number had decreased to 291 farms and 8 dairies. Farming in the Area generally is still on the decrease.

This is one of the few places in the United States that has either a tropical or humid subtropical climate. A large percentage of the soils are nearly level, poorly drained, and infertile. Another fairly large group of soils are organic and nearly level, very poorly drained, and relatively fertile. With drainage and proper fertilization, all of these soils produce excellent winter truck crops.

The coastal areas have excellent facilities for fishing and boating.

Water Supply and Natural Resources

The water supply for the cities in the Broward County Area comes primarily from municipal wells. Many private wells are used mostly for watering lawns. Because porous limestone is below most of the soils, water can move laterally for long distances. The water in the canals can be regulated to help recharge the ground water during dry periods.

Although most of the Area receives about 60 inches of rainfall annually, this amount may not be sufficient to provide water needs in the future. The main alternate source could be Lake Okeechobee to the north of the survey area.

Climate is considered one of the most important natural resources of the Area.

Physiography and Drainage

The Broward County Area can be divided into three general parts based on differences in physiography and soils.

The western part is a nearly level, generally treeless sawgrass plain that appears to be flat. The soils are organic and overlie limestone. In many places the soils are shallow. Under natural conditions, water stood on these soils for months and only during extremely dry seasons was the surface exposed. Today, these soils have been drained, and water stands on the surface for only short periods. With drainage, the organic soils are subject to oxidation and subsidence. When exposed to air, organic matter is oxidized or slowly burned up, and this gradual loss of organic matter results in subsidence or a lowering of surface elevation. Also, during dry seasons, wildfires have burned some of the organic surface soil, and decreased the thickness of the organic material.

Very little of the organic soils are presently farmed. A few acres are in improved pasture. In recent years, after some drainage, several types of trees have become established. These trees are melaleuca, Australian pine, and waxmyrtle. One method used for developing the organic soils for urban use removes the organic material and adds fill consisting of rock or sand.

The central part consists of nearly level, grassy areas interspersed with small ponds. The soils here are wet and sandy and are underlain by limestone. Before drainage, water stood on these soils for several months each year. The original vegetation was water-tolerant grasses and a few cypress stands. In the higher areas, pine and palmetto were common. These areas are now farmed, and with drainage produce excellent pasture and truck crops.

This is also an area of rapid urban development. The underlying limestone is mostly porous, and water moves through it laterally for long distances. Water-control ditches can be further apart in these soils than in soils underlain by sand or loamy material. For urban *at Davie in Broward County*

record 1937–67]

Percent of seasons at or below various temperatures after—						
November 20	December 10	December 30	January 19	February 18	March 10	March 30
100	100	100	83	50	13	0
83	80	73	50	17	3	0
37	37	30	20	3	0	0
17	17	10	17	0	0	0
3	3	3	3	0	0	0

development, fill is commonly added to raise the elevation to such a level that water does not cover the soil surface.

The eastern part is made up of low, sandy ridges, a part of which is commonly referred to as flatwoods. The vegetation is mostly pine, palmetto, and native grasses. The flatwoods part is made up of deep, poorly drained, nearly level, sandy soils. These soils have been used mostly for truck crops and pasture, but are rapidly being developed for urban uses. They require drainage, and fill is added to low areas so that the entire acreage can be developed. The other part is made up of deep, excessively drained or well-drained, sandy soils, many of which, are developed for urban uses.

The major drainage systems in the Area flow from west to east and drain into the Atlantic Ocean. These systems are the Hillsboro Canal at the Palm Beach-Broward County line, the Pompano Canal at Margate, the Midriver Canal at Lauderhill, the North New River Canal at Davie, and C-9 at the Dade County line. These canals are under the control of the Central and Southern Florida Flood Central District.

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(9) Weidling, Philip and Burghard, August. 1966. Checkered sunshine: the story of Fort Lauderdale, 1793–1955. Gainesville, University of Florida Press, 296 pp., illus.

(10) Zelazny, L. W. and Fiskell, J. G. A. 1972. Acidic properites of some Florida soils II. exchangeable and titratable acidity. Soil and Crop Science Society of Florida Proceedings 31: 149–154.

Glossary

Association, soil. A group of soils geographically associated in a characteristic repeating pattern.

Available water capacity (also termed available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

Base saturation. The degree to which material that has base-exchange properties is saturated with exchangeable cations other than hydrogen, expressed as a percentage of the cation-exchange capacity.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Complex, soil. A mapping unit consisting of different kinds of soils that occur in such small individual areas or in such an intricate pattern that they cannot be shown separately on a publishable soil map.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

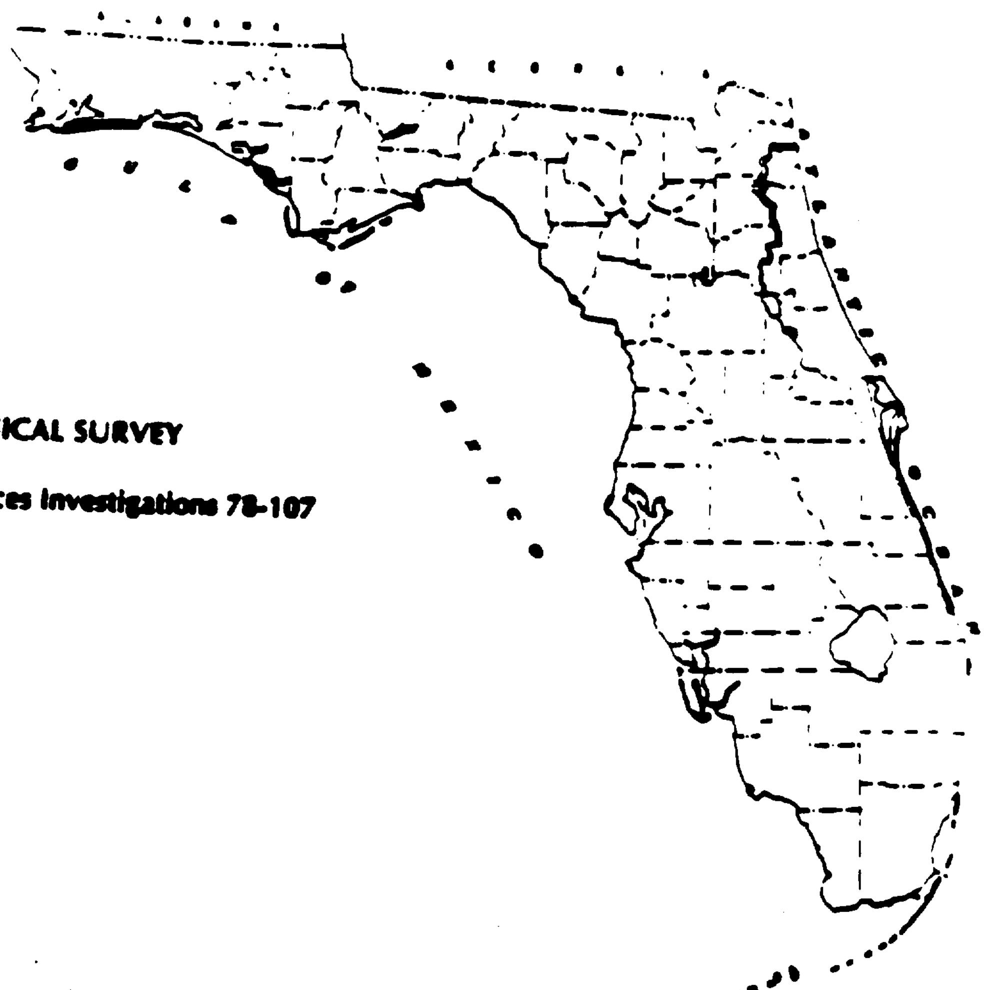
Cemented.—Hard and brittle; little affected by moistening.

Drainage class (natural). Refers to the conditions of frequency and duration of periods of saturation or partial saturation that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven different classes of natural soil drainage are recognized.

WRI 78-107

Reference No. 6

BISCAYNE AQUIFER, SOUTHEAST FLORIDA



U.S. GEOLOGICAL SURVEY

Water-Resources Investigations 78-107

Prepared in cooperation with
U.S. ENVIRONMENTAL PROTECTION AGENCY

WRI 78-107 BISCAYNE AQUIFER, SOUTHEAST FLORIDA

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7. Author(s) H. Klein, J. E. Hull	8. Performing Organization Rept. No. USGS/WRI 78-107
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15. Supplementary Notes

Prepared in cooperation with the U.S. Environmental Protection Agency

16. Abstracts Peak daily pumpage from the highly permeable, unconfined Biscayne aquifer for public water-supply systems in southeast Florida in 1975 was about 500 million gallons. Another 165 million gallons was withdrawn daily for irrigation. Recharge to the aquifer is primarily by local rainfall. Discharge is by evapotranspiration, canal drainage, coastal seepage, and pumping. Pollutants can enter the aquifer by direct infiltration from land surface or controlled canals, septic-tank and other drainfields, drainage wells, and solid-waste dumps. Most of the pollutants are concentrated in the upper 20 to 30 feet of the aquifer; public supply wells generally range in depth from about 75 to 150 feet. Dilution, dispersion, and adsorption tend to reduce the concentrations. Seasonal heavy rainfall and canal discharge accelerate ground-water circulation, thereby tending to dilute and flush upper zones of the aquifer. The ultimate fate of pollutants in the aquifer is the ocean, although some may be adsorbed by the aquifer materials en route to the ocean, and some are diverted to pumping wells.

17. Key Words and Document Analysis. 17a. Descriptors

Southeast Florida, Aquifer characteristics, *Ground-water quality, *Municipal water systems, *Water pollution, Urban runoff, Septic-tank effluent, Leachate, *Ground-water flow, Dilution, Unconfined ground water

17b. Identifiers/Open-Ended Terms

Dade County, Broward County, *Biscayne aquifer, Sole-source aquifer, Safe Drinking Water Act

17c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) UNCLASSIFIED	21. No. of Pages [illegible]
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UNITED STATES DEPARTMENT OF THE INTERIOR

CECIL D. ANDRUS, Secretary

GEOLOGICAL SURVEY

H. William Menard, Director

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325 John Knox Road
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BISCAYNE AQUIFER

Description

The Biscayne aquifer supplies all municipal water supply systems from south Palm Beach County southward (fig. 1), including the system for the Florida Keys which is supplied chiefly by pipeline from the mainland. It is a highly permeable wedge-shaped unconfined aquifer that is more than 200 ft (feet) thick in coastal Broward County and thins to an edge 35 to 40 mi (miles) inland in the Everglades (fig. 2). The aquifer forms an important unit of the hydrologic system of southeast Florida (fig. 3), which is managed by the South Florida Water Management District (SFWMD).

The Biscayne aquifer is composed of limestone, sandstone, and sand. In south and west Dade County the aquifer is primarily limestone and sandstone, but in north Dade County, Broward County and south Palm Beach County the aquifer is primarily sand. Generally, the sand content increases to the north and east.

In Dade County (fig. 4) oolitic limestone and quartz sand form the upper part of the aquifer (Parker and others, 1955, Plate 4). The limestone is thickest along the coast, possibly as much as 40 ft., but the base is usually less than 20 ft below sea level. Inland, the oolitic limestone thins and then disappears beneath the peat soil of the Everglades. Oolitic limestone is usually cross-bedded.

Fine to medium grained sand fills solution cavities in the oolitic limestone. Parker and others (1955, p. 102) indicated that the solution cavities occupy a significant volume of the limestone, causing it to have high horizontal and vertical permeabilities. It is the high vertical permeability that permits rapid infiltration of rainfall to the water table. Where the limestone does not crop out, it is covered by quartz sand (fig. 4) which also permits rapid infiltration of rainfall.

In the east part of Dade County, extending north as far as Fort Lauderdale, the lower part of the oolitic limestone contains bryozoans (Hoffmeister, 1974, p. 39). The bryozoan section slopes upward to the west to emerge at the surface in the Everglades. Near the coast the bryozoan section is as much as 10 ft thick (Hoffmeister, 1974, p. 39); it thins to the west beyond the east boundary of Collier County. The bryozoan limestone is also riddled with cavities which contribute to its high horizontal and vertical permeability.

Below the bryozoan layer, the Biscayne aquifer is composed of hard limestone containing numerous cavities, often cavernous. Because of the extremely high permeability of this limestone, all large-capacity wells are completed in this part of the aquifer, generally 40 to 100 ft below the land surface. The cavernous section generally does not contain loose sand. The aquifer does, however, contain thin interbedded layers of hard, dense limestone in south Dade County, interior parts of Dade County and southwest Broward County. The dense layers probably are discontinuous and may locally retard, but do not prevent the vertical circulation of ground water. Beneath the coastal areas unconsolidated quartz sand separates the bryozoan limestone from the deeper hard limestone. The sand content increases northward which results in a corresponding decrease in overall transmissivity of the aquifer.

Parker and others (1955, p. 160) stated that the Biscayne aquifer "is the most productive of the shallow nonartesian aquifers in the area and is one of the most permeable in the world". He suggested that in east Dade County the transmissivity (hydraulic conductivity x saturated thickness = transmissivity) of the aquifer ranges from 4 to 15 million gallons per day per foot (Mgal/d/ft) ($5.x10^5$ to $2.0x10^6$ ft^2/d). He applied a median value of 5 (Mgal/d/ft) ($6.7x10^5$ ft^2/d) (Parker and others, 1955, p. 270). These values were obtained from aquifer tests using high-capacity wells, and by analyzing water-table contours adjacent to canals and in well-field areas. Storage coefficients from aquifer tests ranged from 0.047 to 0.247 (Parker and others, 1955, table 16).

The approximate areal distribution of transmissivity of the aquifer is shown in figure 5. Along the coast and in the northern part of southeast Florida the aquifer is thickest, but because it is composed mainly of sandy material, the transmissivity is lower. In central and south Dade County the aquifer is thinner, but the hydraulic conductivity is high because of the cavernous limestone; the transmissivity is, therefore, high. The decrease in transmissivity to the west is due to the thinning of the aquifer.

The transmissivity ranges from about 3 Mgal/d per foot ($4.0x10^5$ ft^2/d) in southeast Broward County to 0.4 Mgal/d per foot ($5.4x10^4$ ft^2/d) in the northeast coastal Broward County (Sherwood and others, 1973, p 66-67) and in the vicinity of Boca Raton (McCoy and Hardee, 1970, p. 25). Values increase to about 4 Mgal/d per foot ($5.4x10^5$ ft^2/d) (Sherwood and others, 1973, p. 66) in interior parts of southern Broward County. In Boca Raton, fine and medium sand extends to at least 60 ft below the surface. Permeable limestone at greater depth is discontinuous and becomes increasingly sandy north of Boca Raton (McCoy and Hardee, 1970, p. 7-11). Storage coefficients in Broward County are as high as 0.34 (Sherwood and others, 1973, p. 67).

Soil Cover

The soil that covers southeast Florida is of hydrologic importance because it controls the infiltration of rainfall, the operation of septic tanks, and indirectly relates to the quality of the ground water. The infiltration of rainfall is rapid in areas covered by sand or where soil is absent; infiltration is retarded in areas covered by marl or clayey soil.

In the agricultural areas of south and interior Dade County, irrigation wells are usually rotary drilled to depths of 25 to 35 ft. Casing is not required because the aquifer is solely limestone. Hundreds of these wells are drilled at spacings as small as 300 ft. A large capacity irrigation pump mounted on a truck is moved from well to well and each is pumped for short intervals at rates of 500 to 1,000 gpm.

Thousands of small diameter (2-inch) wells are used throughout the year for irrigation of residential lawns and shrubs. These wells, about 20 to 50 ft deep, are normally pumped at rates of 25 to 40 gpm. In areas near the coast or adjacent to tidal canals no fresh ground water is available so residences use municipal water for lawn irrigation. Shallow wells of small diameter are also used for domestic supplies in areas not serviced by municipal systems.

Recharge and Discharge

The Biscayne aquifer is recharged principally by rainfall. The average annual rainfall in the lower east coast area varies areally from 58 to 64 in; the annual extremes experienced are 29 in and 106 in (Leach and others, 1972, p. 9-10). The rainy season, June - October, contributes about 70 percent of the total. During this period heavy rains are associated with tropical disturbances and frequent short, local downpours. Light to moderate rainfall during the dry season is associated with cold fronts moving southward through Florida.

The oolitic limestone and sand that form the upper surface of the aquifer readily absorb rainfall and move it rapidly to the water table. The rapid response of the water table to rainfall in the Miami area is indicated in figure 9. Infiltration of rainfall is retarded but not prevented in interior parts of Dade and Broward Counties where thin marl deposits cover the surface, and along the shallow elongate depressions that dissect the urban area. Other sources of recharge to the aquifer are: (1) Connate ground water of inferior quality (Parker and others, 1955, fig. 221) along the upper reaches of the Miami, the North New River, and the Hillsboro Canals in Broward and Palm Beach Counties (northwest of the limits of the Biscayne aquifer) that is transferred eastward during dry seasons; (2) Water from Lake Okeechobee released by the SFWMD into the Miami Canal during the later weeks of the dry seasons to replenish the Miami area; and (3) Effluent from septic tanks, certain sewage treatment plant and disposal ponds scattered throughout the urban area.

Parker and others (1955) and Meyer (1971) estimated that 20 in of the approximately 60 in of annual rainfall in Dade County is lost directly by evaporation, about 20 in is lost by evapotranspiration after infiltration, 16 to 18 in is discharged by canals and by coastal seepage, and the remainder is utilized by man. Sherwood and others (1973, p. 49) indicated comparable values for Broward County. Thus, nearly 50 percent of the rainfall that infiltrates the Biscayne aquifer is discharged to the ocean, a reflection of the high degree of connection between the aquifer and the canal system.

NUS CORPORATION **INTERNAL CORRESPONDENCE**

C-586-3-0-209

TO:	K. D. Pass, Florida Section Leader	**DATE:**	March 22, 1990
FROM:	W. Smitherman WS	**COPIES:**	Phil Blackwell Bob Donaghue Katharine Siders

SUBJECT: Municipal Water Systems for Broward County, Florida

Due to the large number of sites in Broward County to be assessed, I have assembled a data base for the municipal water systems in the county. Information was obtained during visits to the municipalities, telephone conversations and through the mail. Two basic documents were generated, the first being the data base (attached as Appendix A) to provide the system names, a principal contact to verify information, telephone numbers, addresses, the number of connections or population served, number of wells and wellfields and a remarks section. The second document is a detailed topographic map showing the extent of the municipalities' distribution system along with the location of their wells and wellfields. In addition to the topographic map, almost all the municipalities provided maps, showing their distribution areas along with the wells and wellfields, for additional reference if needed.

The topographic map will be available in a central location so that the project managers can locate their sites on the map. The project managers can then identify the systems (wellfields) within the 4-mile radius of their sites and use the data base to call up only those municipalities within the 4-mile radius that pertain to their sites.

In preparing this information, several interesting items were identified:

1. The city of Ft. Lauderdale provides potable water to the cities of Wilton Manor and Oakland Park, since they do not have wells.

2. The city of Coconut Creek purchases water from the Broward County Utility Dept. (BUCD)-2A wellfield. Coconut Creek does not have municipal wells.

3. The city of Coral Springs has 4 different systems within the city limits. Coral Springs Improvement District provides potable water to the southern third of the city. The city of Coral Springs provides water to the middle third of the city. Royal Utilities (a small area) and the North Springs Improvement District provides potable water to the northern third of the city.

4. Broward County Utility Department (BCUD) has 7 systems in the county; however, system BCUD 3C is off-line and potable water is provided by the city of Hollywood.

5. All systems in the county have emergency hook-ups with other municipalities, except the Royal Utilities in Coral Springs. This system has no emergency hook-up.

6. Several communities have multiple wellfields; in all cases the water is mixed in the distribution lines. The three systems for the city of Plantation are presented since the number of connections for each were available.

7. The depths of wells were not recorded on the data base, since all the wells are obtaining water from the Biscayne aquifer, a sole-source aquifer. However, information obtained during interviews revealed that most municipal wells ranged from 80-120 feet below land surface (bls).

8. In general, the distribution area for each municipality was normally the corporate city limits.

The objective of this memorandum was to gather the needed information into one source and to assist the project manager in obtaining the groundwater use data necessary to complete the site assessments in a timely manner. Bringing together all the municipal systems in the county into one data base and one map showing the locations should expedite this process. Any project managers wishing to access the data base should consult either you or me.

MUNICIPAL WATER SYSTEM
FOR SELECTED SYSTEMS

05/15/90

SYSTEM	CONTACT PHONE	ADDRESS	(P)OP SERVED (C)ONNECTIONS	# OF WELLS	# OF FIELDS	DATE ENTERED	REMARKS
BCUD - 1A	MIKE SCOTTIE (305)960-3051	BROWARD CTY UTIL DPT 2401 N POWERLINE RD POMPANO BEACH, FL 33064	10843 (C)	7	1	04/23/90	Emergency hookups with Ft. Lauderdale, Tamarac, and Lauderdale
BCUD - 1B	MIKE SCOTTIE (305)960-3051	BROWARD CTY UTIL DPT 2401 N POWERLINE RD POMPANO BEACH, FL 33064	3397 (C)	5	1	03/15/90	In production 8 hrs/day, interconnect with BCUD-1A Emergency hookup with Ft. Lauderdale
BROADVIEW	MIKE SCOTTIE (305)960-3051	BROWARD CTY UTIL DPT 2401 N POWERLINE RD POMPANO BEACH, FL 33064	2185 (C)	3	1	03/15/90	Emergency hookups with Tamarac and N. Lauderdale
FT LAUDERDALE	JAMES SINDELAR (305)492-7858	FT LAUDERDALE UTIL P.O. BOX 14250 FT. LAUDERDALE, FL 33302	56000 (C)	43	2	03/15/90	Supply potable water to Wilton Manor, Oakland Park, BCUD, BC Port Auth, Dania and Tamarac East
OAKLAND PARK	ROLLAND SALSBERRY (305)561-6259	OAKLAND PARK UTIL 3650 NE 12TH AVE OAKLAND PARK, FL 3334	2700 (C)	0	0	03/15/90	Potable water supplied by City of Ft. Lauderdale
WILTON MANOR	JOE MOSS (305)390-2190	CITY OF WILTON MANOR 524 NE 21ST COURT WILTON MANOR, FL 33305	4500 (C)	0	0	03/15/90	Potable water supplied by city of Ft. Lauderdale

Reference No. 8

?CE . Environmental Science Services Administration . Environmental Data Service

U.S. DEPARTMENT OF COMMERCE
C. R. Smith, Secretary

ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
Robert M. White, Administrator

ENVIRONMENTAL DATA SERVICE
Woodrow C. Jacobs, Director

JUNE 1968

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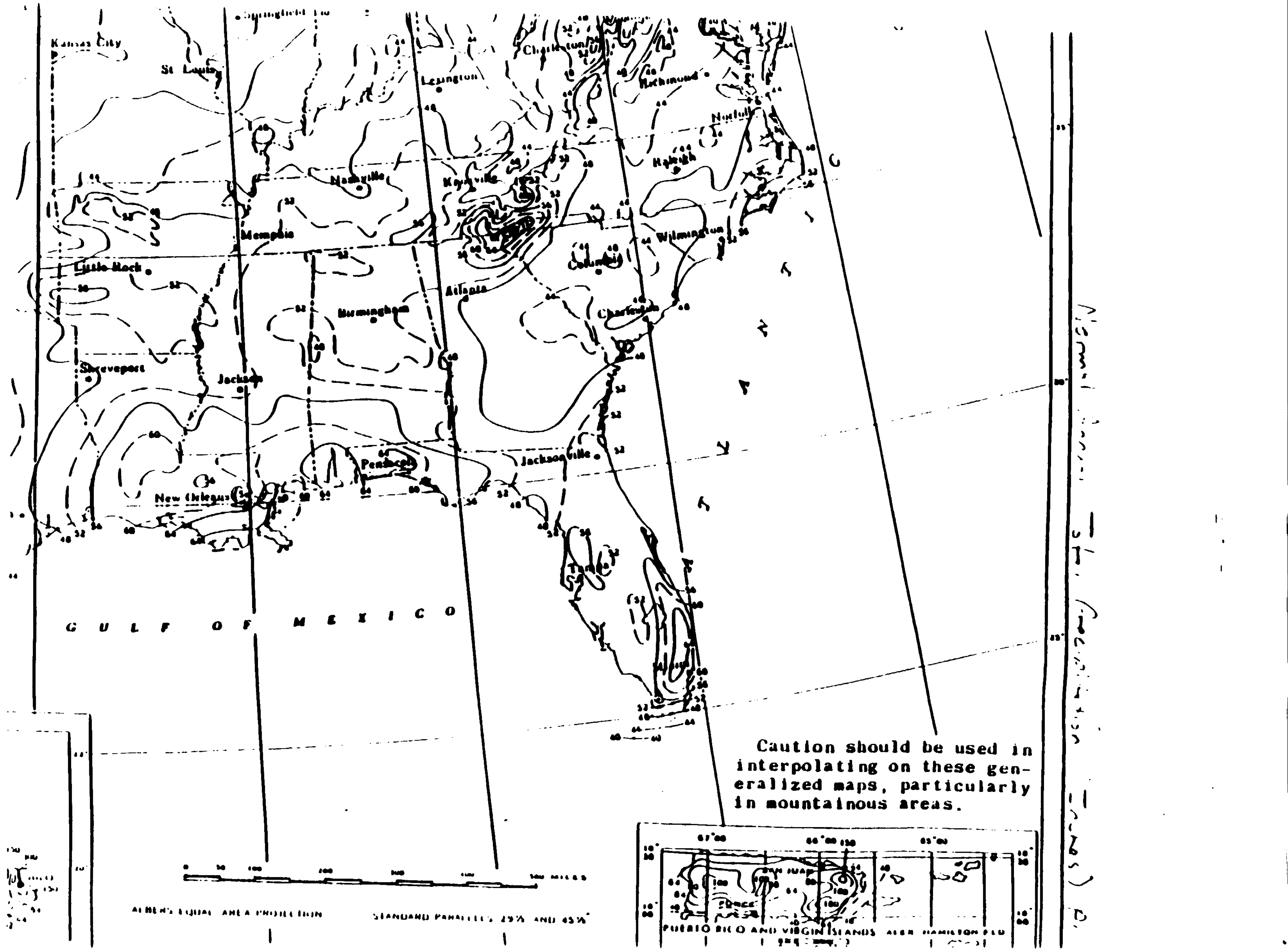
1983



Caution should be used in interpolating on these generalized maps, particularly in mountainous areas.

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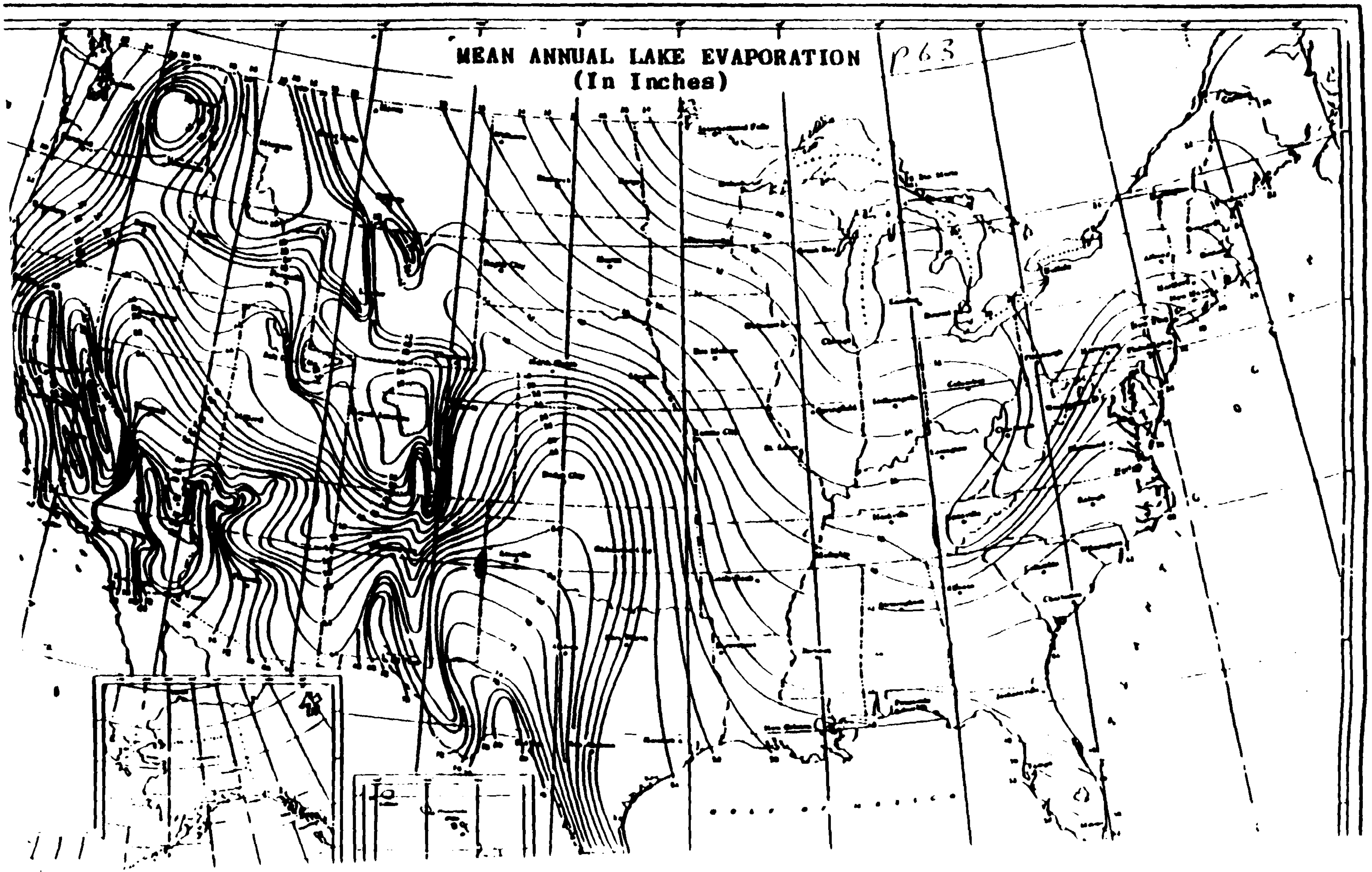

Reference No. 10

GEOLOGY OF THE SURFICIAL AQUIFER SYSTEM

BROWARD COUNTY, FLORIDA

LITHOLOGIC LOGS

By Carmen R. Causaráś

U.S. GEOLOGICAL SURVEY

WATER-RESOURCES INVESTIGATIONS REPORT 84-4068

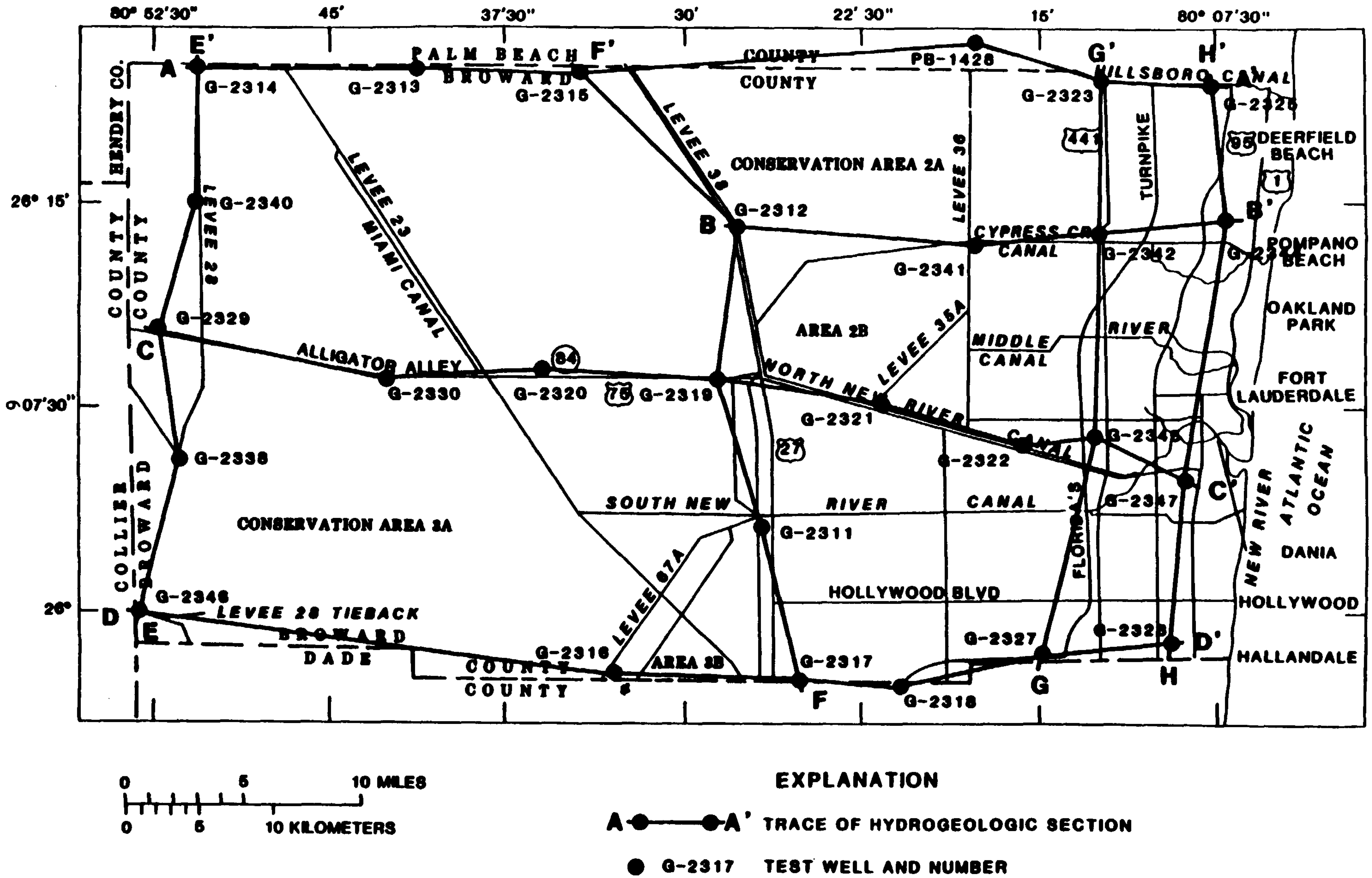

Figure 3.--Location of test drilling sites and hydrogeologic sections (from Causaras, 1985). Well numbers and site names are listed in table 1.

OVERSIZED

DOCUMENT

MAP

Reference No. 11

Water Resources of Southeastern Florid

By GARALD G. PARKER, G. E. FERGUSON, S. K. LOVE, and others

WITH SPECIAL REFERENCE TO THE GEOLOGY AND GROU
WATER OF THE MIAMI AREA

GEOLOGICAL SURVEY WATER-SUPPLY PAPER

Prepared in cooperation with the Florida Geological Survey, Dade County, cities of Miami and Miami Beach, and other agencies

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON

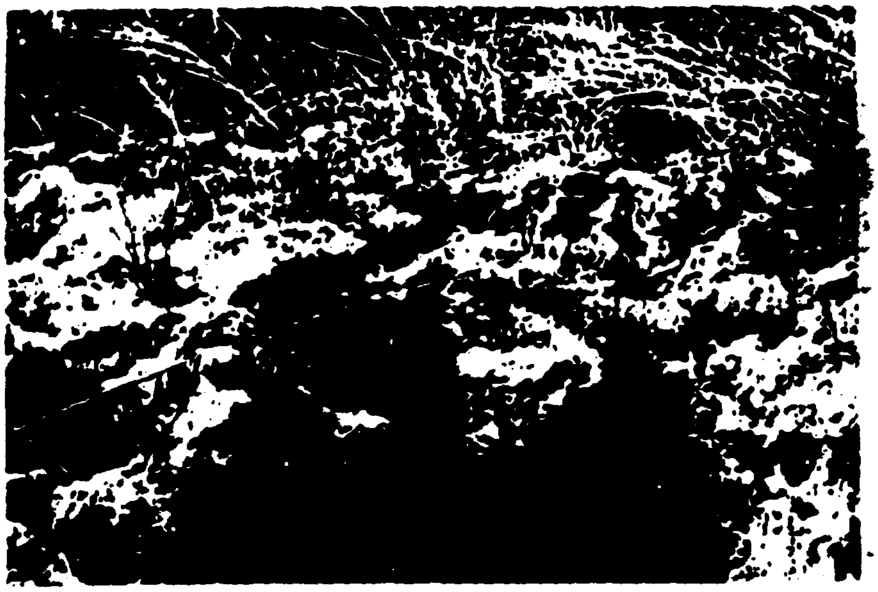

Figure 25.--Close-up view of one of the larger solution holes in Dade County.

and downward movement of corrosive waters. (See figs. 15, 25 and 26.)

Apparently, no original cavity is needed to start a solution hole, though the existence of a ready-made hole hastens the process. It has been suggested that many vertical solution holes begin to be dissolved along taproots of trees, and possibly some holes do originate in this fashion, but it is not the most common way. On the surface of hard limestone or soft calcareous clayey marl the first effects of solution appear as small surficial pits resembling raindrop marks in mud. These pits gradually deepen, many retaining their rounded outlines. Without visible outlet along the sides or bottom, they later become tubes which enlarge into holes of various shapes and sizes, but generally they develop vertically.

The work of solution is evident wherever outcrops of rock occur, as on the bare limestone surface south of Miami or in the Big Cypress Swamp, in canals and street cuts, in borrow ditches and rock quarries, or in river and creek banks. In large areas of southern Florida it is evident that at least one-fourth of the total volume of limestone, once more or less solid rock, is now occupied by solution holes, generally filled with sand. (See fig. 26.) Trees blown over by hurricanes rip up rock with their roots, thus leaving a new and localized depression for concentration of rain water and the start of active solution holes. Adjacent holes enlarge, coalesce, and become increasingly effective in draining surface water underground. Many solution depressions of this kind,

Reference No. 12

STATE BOARD [illegible]

FLORIDA GEOLOGICAL SURVEY

REPORT OF INVESTIGATIONS NO. 17

BISCAYNE [illegible]
[illegible] AND [illegible] FLORIDA

[illegible] and NEVIN D. HOY
U.S. [illegible]

REF.

TABLE OF CONTENTS

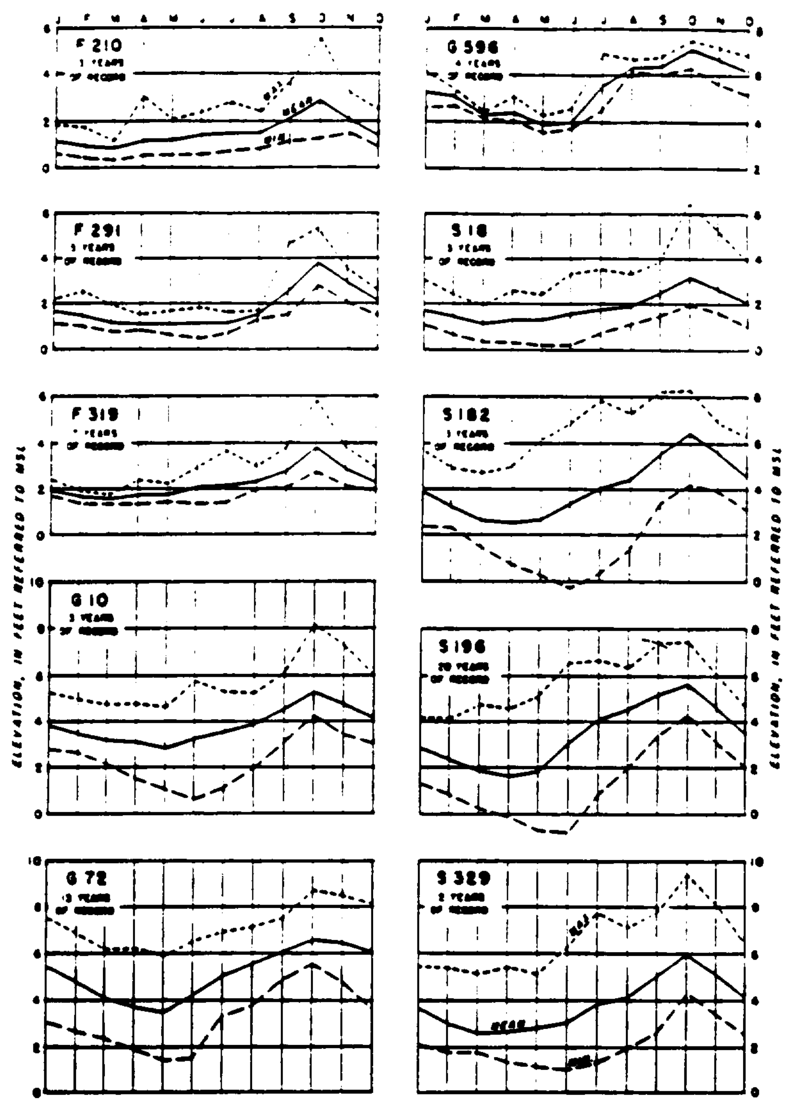

Figure 12. Chart of comparative average monthly water levels in selected wells.

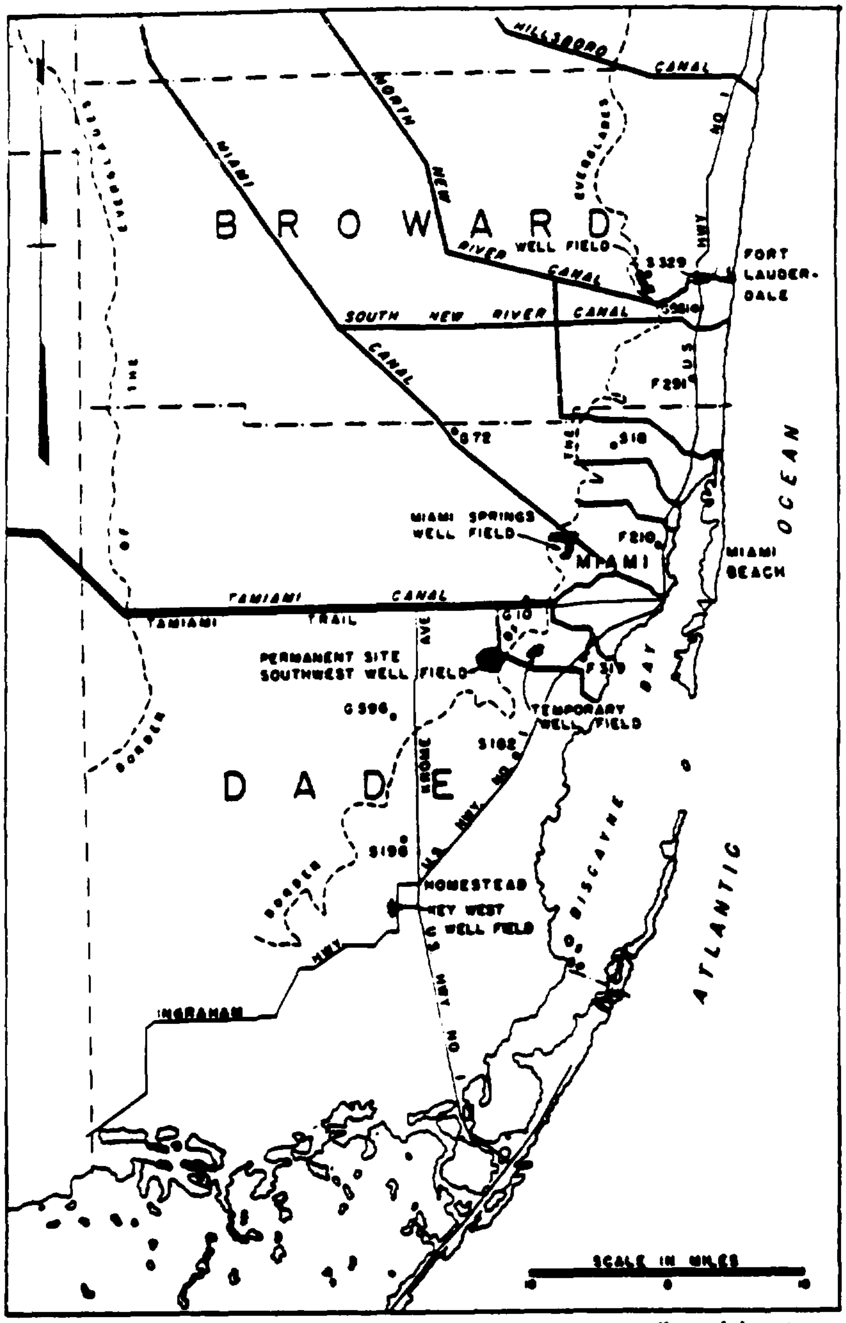

Figure 13. Map showing location of certain observation wells and locations of large municipal well fields.

p. 519-524) and as reported by Parker (Parker, Ferguson, Love, and others, 1955, p. 239-274) are summarized in the following table (see fig. 14 for location of test sites).

Test site	*Range in computed coefficient of transmissibility (gpd/ft)*	
	Lowest	Highest
S 1	3,250,000	4,300,000
G 551	9,000,000	14,000,000
G 552	2,800,000	5,700,000
G 553	2,500,000	3,900,000
G 218	3,900,000	4,400,000

At all the test sites the Miami oolite forms the upper part of the Biscayne aquifer, and at most of them it is underlain by a bed of sand. The permeability of the oolite and sand is lower than that of the underlying cavernous limestone of the Fort Thompson formation and thus acts as a leaky roof during the pumping of a well, and the formation initially acts as an artesian aquifer. The Bessel function then can be used in the computations using formulas developed by Jacob (1945, p. 198-208). John G. Ferris (1950, personal communcation) determined the following values from the test data:

Well No.	*Coefficient of transmissibility (gpd/ft)*
S 1	3,200,000
G 551	9,700,000
G 552	3,200,000
G 553	3,200,000

The T value of the test for well G 551 by both calculations is inconsistent with the values for the other tests. The results of the other three tests using the Bessel function are extraordinarily consistent considering the character of the aquifer. The permeability of the Biscayne aquifer probably averages between 50,000 and 70,000 gallons per day per square foot, according to Parker (1951). No satisfactory computation of the storage coefficient has yet been obtained.

Several assumptions concerning the aquifer must be applied in using formulas to determine these coefficients: (1) the aquifer is homogeneous and isotropic and transmits water with equal readiness in all directions; (2) the discharging well penetrates the entire thickness of the aquifer; (3) there is no turbulent flow within the aquifer, and during the pumping there is no vertical convergence of flow lines toward the pumped well; and (4) water is discharged from storage instantaneously with reduction in head.

Reference No. 13

R. Allan Freeze

Department of Geological Sciences
University of British Columbia
Vancouver, British Columbia

John A. Cherry

Department of Earth Sciences
University of Waterloo
Waterloo, Ontario

GROUNDWATER

Prentice-Hall, Inc.
Englewood Cliffs, New Jersey 07632

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Table 2.2 Range of Values of Hydraulic Conductivity and Permeability

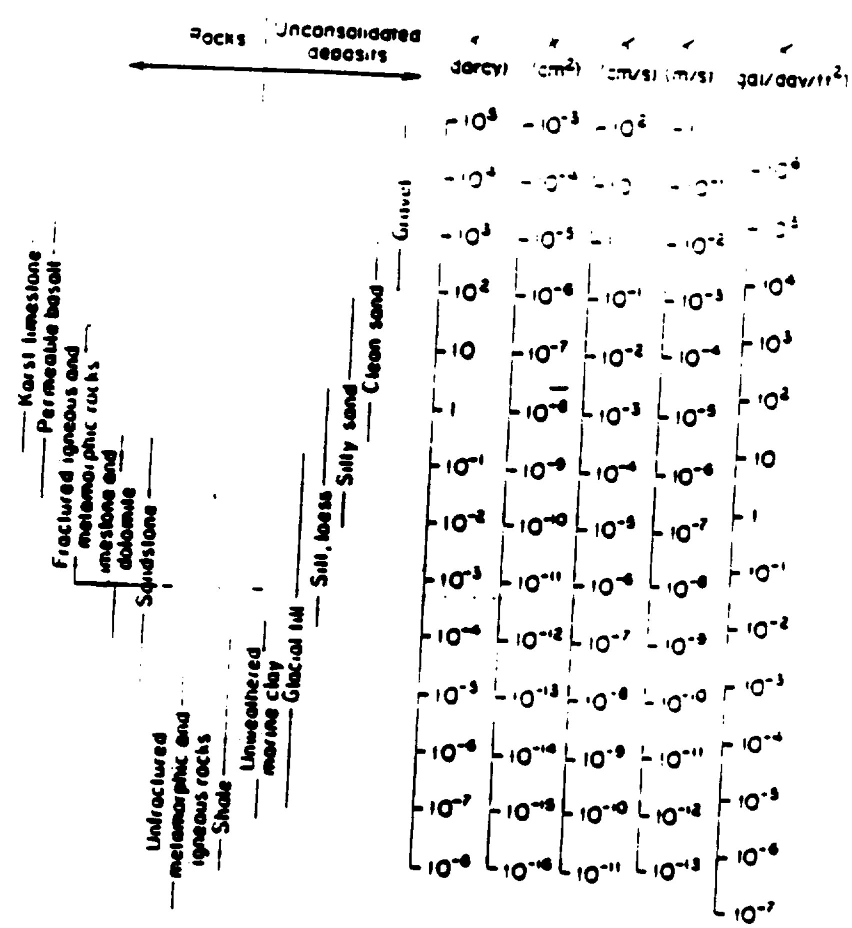


Table 2.3 Conversion Factors for Permeability and Hydraulic Conductivity Units

	Permeability, k*			Hydraulic conductivity, K		
	cm²	ft²	darcy	m/s	ft/s	U.S. gal/day/ft²
cm²	1	1.08×10^{-3}	1.01×10^{8}	9.80×10^{2}	3.22×10^{3}	1.85×10^{9}
ft²	9.29×10^{2}	1	9.42×10^{10}	9.11×10^{5}	2.99×10^{6}	1.71×10^{12}
darcy	9.87×10^{-9}	1.06×10^{-11}	1	9.66×10^{-6}	3.17×10^{-5}	1.82×10^{1}
m/s	1.02×10^{-3}	1.10×10^{-6}	1.04×10^{5}	1	3.28	2.12×10^{6}
ft/s	3.11×10^{-4}	3.35×10^{-7}	3.15×10^{4}	3.05×10^{-1}	1	6.46×10^{5}
U.S. gal/day/ft²	5.42×10^{-10}	5.83×10^{-13}	5.49×10^{-2}	4.72×10^{-7}	1.55×10^{-6}	1

*To obtain k in ft², multiply k in cm² by 1.08×10^{-3}.

Freeze, R.A., and J.A. Cherry, "Groundwater"
Prentice-Hall, Inc., Englewood Cliff[illegible]

Reference No. 14

STATE OF FLORIDA
DEPARTMENT OF NATURAL RESOURCES
Harmon Shields, *Executive Director*

DIVISION OF INTERIOR RESOURCES
Charles M. Sanders, *Director*

BUREAU OF GEOLOGY
Charles W. Hendry, Jr., *Chief*

Report of Investigations No. 75

EVALUATION OF HYDRAULIC CHARACTERISTICS OF A DEEP ARTESIAN AQUIFER FROM NATURAL WATER-LEVEL FLUCTUATIONS, MIAMI, FLORIDA

REF

by
Frederick W. Meyer
U. S. Geological Survey

Prepared by the
UNITED STATES GEOLOGICAL SURVEY
in cooperation with the
BUREAU OF GEOLOGY
FLORIDA DEPARTMENT OF NATURAL RESOURCES
and with other
CITY, COUNTY, STATE, AND FEDERAL AGENCIES

Tallahassee, Florida

1974

CONTENTS

LOCATION AND GEOHYDROLOGIC SETTING

The Peninsula well is in Dade County, about 10 miles southwest of Miami (fig. 1). It is 2,927 feet deep and is cased to 1,810 feet (fig. 2). The land surface at the well is about 6 feet above msl (National Ocean Survey, mean sea-level datum 1929).

The local water supply is obtained from the Biscayne aquifer, a highly permeable limestone strata that underlies the area to a depth of about 100 feet. Beneath the Biscayne aquifer is a 300-foot thick confining bed composed of sand and clay, which confines the water in the underlying Floridan aquifer system. The Floridan is about 1,500 feet thick and is composed of several

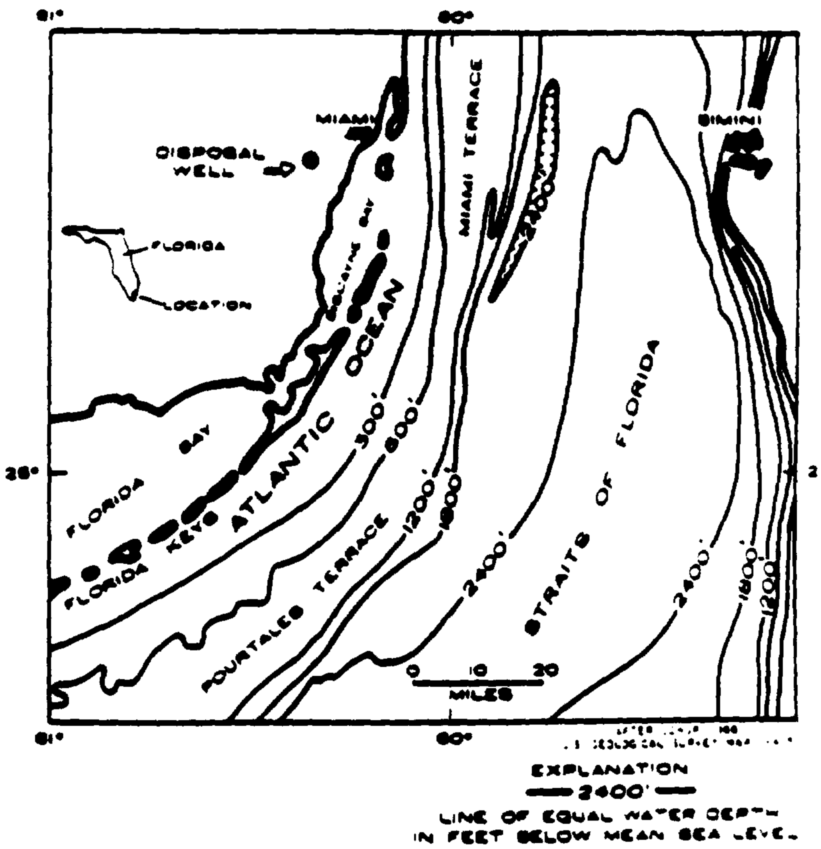


Figure 1 Map showing site location.

hydraulically separate water-bearing zones (Meyer, 1971). The upper 600-foot section is composed of limestone interbedded with calcareous clay and the lower 900-foot section (the principal water-bearing zone) is composed chiefly of highly permeable dolomitic limestone. The head and the salinity of the ground water increase with depth in the Floridan aquifer. Locally the head of the brackish water in the principal artesian water-bearing zone stands 41 feet above msl.

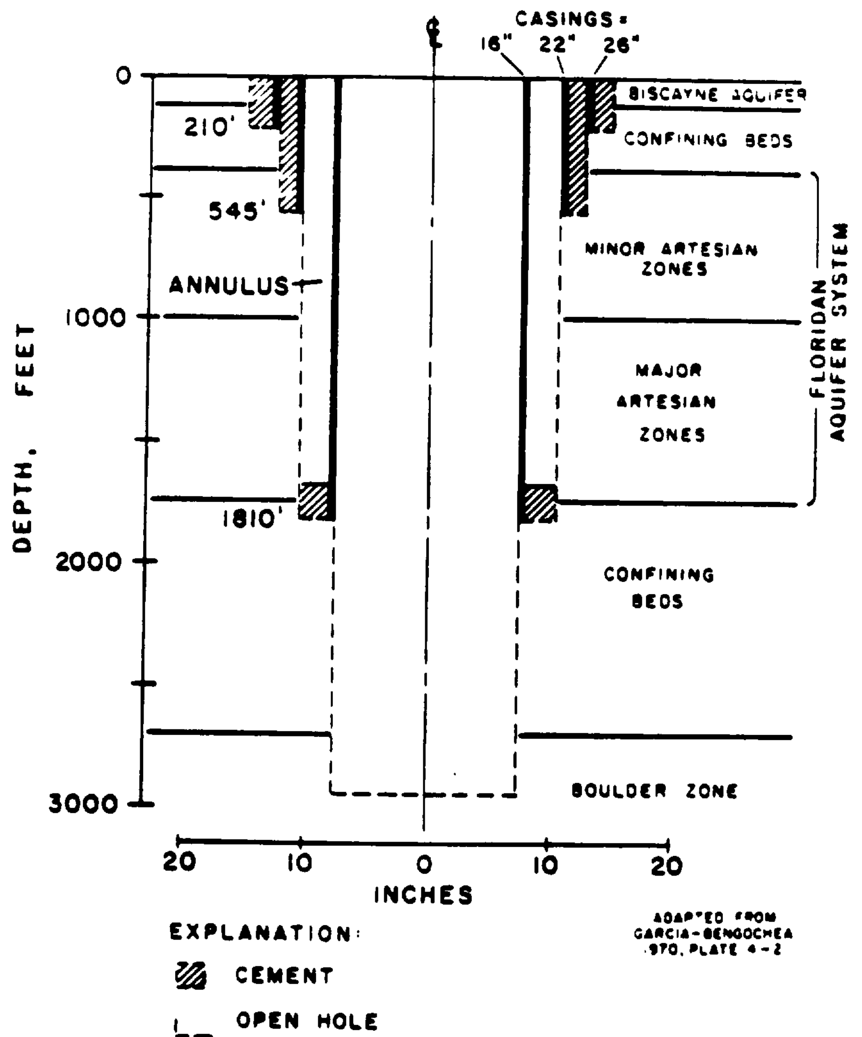
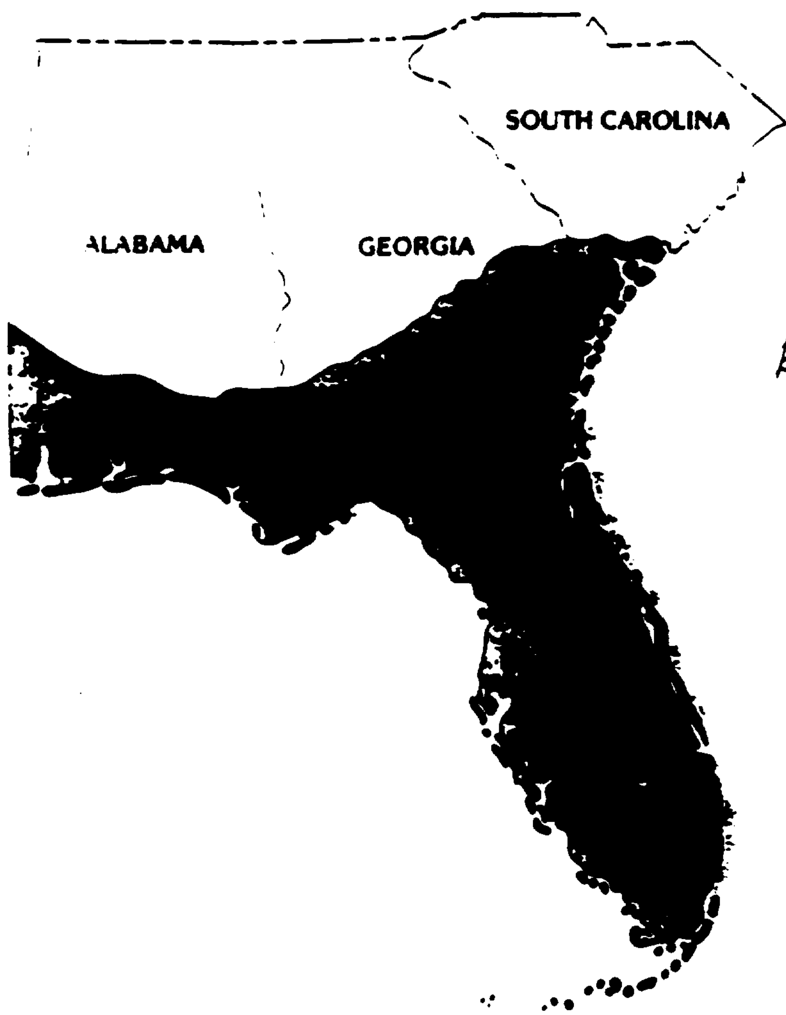


Figure 2 Sketch showing well construction.

Reference No.15

SUMMARY OF THE HYDROLOGY OF THE FLORIDAN AQUIFER SYSTEM IN FLORIDA AND IN PARTS OF GEORGIA, SOUTH CAROLINA, AND ALABAMA



REF

U.S. GEOLOGICAL SURVEY PROFESSIONAL

Summary of the Hydrology of the Floridan Aquifer System in Florida and in Parts of Georgia, South Carolina, and Alabama

By RICHARD H. JOHNSTON *and* PETER W. BUSH

REGIONAL AQUIFER-SYSTEM ANALYSIS

U.S. GEOLOGICAL SURVEY PROFESSIONAL PAPER 1403-A

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1988

CONTENTS

ILLUSTRATIONS

[Plates are in pocket]

TABLES

TABLE 1.—*Terminology applied to the Floridan aquifer system*

SERIES/STAGE		PARKER AND OTHERS (1955)		SPRINGFIELD (1966)		MILLER (1982b, 1982d)		MILLER (1986)	
		Formations[1]	Aquifer	Formations[1]	Aquifer	Formations[1]	Aquifers	Formations[1]	Aquifers
MIOCENE		Hawthorn Formation	Where permeable	Hawthorn Formation		Hawthorn		Hawthorn	
MIOCENE		Tampa Limestone	Floridan aquifer	Tampa Limestone	Principal artesian aquifer	Tampa Limestone	Where permeable	Tampa Limestone	Where permeable
OLIGOCENE		Suwannee Limestone	Floridan aquifer	Suwannee Limestone	Principal artesian aquifer	Suwannee Limestone	Tertiary limestone aquifer system	Suwannee Limestone	Floridan aquifer system
EOCENE	Upper	Ocala Limestone	Floridan aquifer	Ocala Limestone	Principal artesian aquifer	Ocala Limestone	Tertiary limestone aquifer system	Ocala Limestone	Floridan aquifer system
EOCENE	Middle	Avon Park Limestone Lake City Limestone	Floridan aquifer	Avon Park Limestone Lake City Limestone	Principal artesian aquifer	Avon Park Limestone Lake City Limestone	Tertiary limestone aquifer system	Avon Park Formation	Floridan aquifer system
EOCENE	Lower			Oldsmar Limestone	Principal artesian aquifer	Oldsmar Limestone	Tertiary limestone aquifer system	Oldsmar Formation	Floridan aquifer system
PALEOCENE						Cedar Keys Limestone	Tertiary limestone aquifer system	Cedar Keys Formation	

[1] Names apply only to peninsular Florida and southeast Georgia except for Ocala Limestone and Hawthorn Formation.

greater than that of those rocks that bound the system above and below. As shown in table 1, the Floridan includes units of Late Paleocene to Early Miocene age. Locally in southeast Georgia, the Floridan includes carbonate rocks of Late Cretaceous age (not shown in table 1). Professional Paper 1403–B presents a detailed geologic description of the Floridan, its component aquifers and confining units, and their relation to stratigraphic units.

The top of the Floridan aquifer system represents the top of highly permeable carbonate rock that is overlain by low-permeability material—either clastic or carbonate rocks. Throughout much of the area, this upper confining unit consists largely of argillaceous material of the Miocene Hawthorn Formation (table 1). Similarly the base of the Floridan is that level below which there is no high-permeability rock. Generally the underlying low-permeability rocks are either fine-grained clastic materials or bedded anhydrite. These sharp permeability contrasts at the top and base of the Floridan commonly occur within a formation or a time-stratigraphic unit as described by Miller (1986).

AQUIFERS AND CONFINING UNITS

The Floridan aquifer system generally consists of an Upper Floridan aquifer and a Lower Floridan aquifer, separated by less-permeable beds of highly variable properties termed the middle confining unit (Miller, 1986, p. B53). In parts of north Florida and southwest Georgia, there is little permeability contrast within the aquifer system. Thus in these areas the Floridan is effectively one continuous aquifer. The upper and lower aquifers are defined on the basis of permeability, and their boundaries locally do not coincide with those of either time-stratigraphic or rock-stratigraphic units. The relations among the various aquifers and confining units and the stratigraphic units that form them are shown on plate 1, a fence diagram modified from Miller (1986, pl. 30). A series of structure contour maps and isopach maps for the aquifers as well as the seven principal stratigraphic units that make up the Floridan aquifer system and its contiguous confining units is presented in Professional Paper 1403–B. These maps and associated cross sections were prepared by Miller (1986) based on geophysical logs, lithologic descriptions of cores and cuttings, and faunal data for the stratigraphic units, plus hydraulic-head and aquifer-test data for the hydrogeologic units.

The fence diagram shows the Floridan gradually thickening from a featheredge at the outcrop area of Alabama-Georgia-South Carolina to more than 3,000 ft in southwest Florida. Its maximum thickness is about 3,500 ft in the Manatee-Sarasota County area of southwest Florida. In and directly downdip from much of the outcrop area, the Floridan consists of only one permeable unit. Further downdip in coastal Georgia and much of Florida, the Upper and Lower Floridan aquifers become prominent hydrogeologic units where they are separated by less-permeable rocks.

Overlying much of the Floridan aquifer system are low-permeability clastic rocks that are termed the upper confining unit. The lithology, thickness, and integrity of this confining unit has a controlling effect on the development of permeability in the Upper Floridan and the ground-water flow in the Floridan locally. (See later sections on transmissivity and regional ground-water flow.)

Plate 2 shows where the Upper Floridan is unconfined, semiconfined, or confined. Actually the Upper Floridan rarely crops out, and there is generally either a thin surficial sand aquifer or clayey residuum overlying the Upper Floridan. Sinkholes are common in the unconfined and semiconfined areas and provide hydraulic connection between the land surface and the Upper Floridan. In the semiconfined and confined areas, the upper confining unit is mostly the middle Miocene Hawthorn Formation, which consists of interbedded sand and clay that are locally phosphatic and contain carbonate beds. In southwest Florida, the carbonate beds locally form aquifers. Professional Papers 1403-E and 1403-F discuss these local aquifers in detail.

There are two important surficial aquifers overlying the upper confining unit locally: (1) the fluvial sand-and-gravel aquifer in the westernmost Florida panhandle and adjacent Alabama and (2) the very productive Biscayne aquifer (limestone and sandy limestone) of southeast peninsular Florida. Both of these aquifers occur in areas where water in the Floridan is saline; hence they are important sources of freshwater.

The Upper Floridan aquifer forms one of the world's great sources of ground water. This highly permeable unit consists principally of three carbonate units: the Suwannee Limestone (Oligocene), the Ocala Limestone (upper Eocene), and the upper part of the Avon Park Formation (middle Eocene). Detailed local descriptions of the geology and hydraulic properties of the Upper Floridan are provided in many reports listed in the references and especially in the summary by Stringfield (1966). The hydraulic properties section of this report discusses the large variation in transmissivity (as many as three orders of magnitude) within the Upper Floridan. Professional Paper 1403-B discusses the geologic reasons for these variations.

Within the Upper Floridan aquifer (and the Lower Floridan where investigated) there are commonly a few highly permeable zones separated by carbonate rock whose permeability may be slightly less or much less than that of the high-permeability zones. Many local studies of the Floridan have documented these permeability contrasts generally by use of current meter traverses in uncased wells. For example, Wait and Gregg (1973) observed that wells tapping the Upper Floridan in the Brunswick, Ga., area obtained about 70 percent of their water from (approximately) the upper 100 ft of the Ocala Limestone and about 30 percent from a zone near the base of the Ocala. Separating the two zones is about 200 ft of less-permeable carbonate rock. Leve (1966) described permeable zones of soft limestone and dolomite and less-permeable zones of hard massive dolomite in the Upper Floridan of northeast Florida.

The Upper and Lower Floridan aquifers are separated by a sequence of low-permeability carbonate rock of mostly middle Eocene age. This sequence, termed the middle confining unit, varies greatly in lithology, ranging from dense gypsiferous limestone in south-central Georgia to soft chalky limestone in the coastal strip from South Carolina to the Florida Keys. Seven subregional units have been identified and mapped as part of the middle confining unit (see detailed descriptions in Professional Paper 1403-B). Much of the middle confining unit consists of rock formerly termed Lake City Limestone but referred to here as the lower part of the Avon Park Formation (table 1).

The Lower Floridan aquifer is comparatively less known geologically and hydraulically than the Upper Floridan. Much of the Lower Floridan contains saline water. For this reason and because the Upper Floridan is so productive, there is little incentive to drill into the deeper Lower Floridan in most areas. The Lower Floridan consists largely of middle Eocene to Upper Paleocene carbonate beds, but locally in southeast Georgia also includes uppermost Cretaceous carbonate beds. There are two important permeable units within the Lower Floridan: (1) a cavernous unit of extremely high permeability in south Florida known as the Boulder zone and (2) a partly cavernous permeable unit in northeast Florida and southeast coastal Georgia herein termed the Fernandina permeable zone. These units are further described in Professional Papers 1403-G and 1403-D, respectively.

Table 2 summarizes the geographic occurrence of aquifers and confining units within the Floridan aquifer system and shows the hydrogeologic nomenclature used in each Professional Paper. The units given in the table are hydraulic equivalents intended for use in describing and simulating the regional flow system. No stratigraphic equivalency or thickness connotation is intended in this table. For example, the Upper Floridan aquifer in the western Florida panhandle consists principally of the Suwannee (Oligocene) Formation. However, in central Florida the Ocala and Avon Park Formations constitute much of the high-permeability rock in the Upper Floridan.

NUS CORPORATION AN   **TELECON NOTE**

Reference No. 17

CONTROL NO.	**DATE:** May 4, 1990	**TIME:** 1240

DISTRIBUTION:

BETWEEN: Hattie Platts	**OF:** Ft. Lauderdale Water Works	**PHONE:** (305) 761-5048

AND: Margo Westmoreland, NUS Corporation

DISCUSSION:

Subject: Storm drains located on and around the Ft. Lauderdale Executive Airport

Mrs. Platts stated that the storm drains are all dry wells which are owned by various businesses. The dry wells allow water to seep into the ground. Water on and around the Ft. Lauderdale Executive Airport is not channeled to a canal or a lake.

Reference No. 18

Enter the next ring distance
GEMS> 6.4

Enter the next ring distance
GEMS>
No city found - press RETURN to try again.

COVERAGE
========

STATE	COUNTY	STATE NAME	COUNTY NAME
12	11	Florida	Broward Co

CENTER POINT AT STATE : 12 Florida
COUNTY : 11 Broward Co

Press RETURN key to continue...

REGION OF THE COUNTRY
=====================

Zipcode found: 33307 at a distance of 1.1 Km

STATE	CITY NAME	COMMUNITY	FIPSCODE	LATITUDE	LONGITUDE
FL	FORT LAUDERDALE	OAKLAND PARK	12011	26.1700	80.1333

Press RETURN key to continue ...

CENSUS DATA
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A.E. PRODUCTS
LATITUDE 26:10:40 LONGITUDE 80: 8:27 1980 POPULATION

KM	0.00-.400	.400-.810	.810-1.60	1.60-3.20	3.20-4.80	4.80-6.40	SECTOR TOTALS
S 1	0	0	0	6757	3724	9144	19625
S 2	0	0	2191	9283	12714	11504	35697
S 3	0	920	1990	3530	11306	0	17746
S 4	0	0	1517	6100	8802	3905	20324
S 5	0	0	0	8191	16369	23217	47777
S 6	0	0	2794	1748	10844	20032	35408
S 7	1922	0	1361	5102	1938	6249	16572
S 8	0	1685	1560	722	511	4840	9318
RING TOTALS	1922	2605	11403	41432	66208	78891	202467

Press RETURN key to continue ...

STAR STATION
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INDEX NUMBER	STATION NAME	LATITUDE DEGREE	LONGITUDE DEGREE	PERIOD OF RECORD	STABILITY CLASSES	DISTANCE (Km)
12839	MIAMI FL	25.8000	80.2667			6 43.31
12844	WEST PALM BEACH FL	26.6833	80.1000			5 55.31
12835	FT MYERS/PAGE FL	26.5833	81.8667			6177.58
12868	CAPE CANAVERAL FL	28.4833	80.5667			6259.56
12815	ORLANDO/JET PORT FL	28.4500	81.3000			6277.15
13510	TAMPA/MACDILL FL	27.8500	82.5167			5299.67
12842	TAMPA FL	27.9667	82.5333			6309.04

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U.S. SOIL DATA
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STATE : FLORIDA

LATITUDE : 25:10:40 LONGITUDE : 80: 8:27
THE STATION IS INSIDE H.U. 3090202

GROUND WATER ZONE : 10
RUNOFF SOIL TYPE : 4
EROSION : 5.2250E-05 CM/MONTH
DEPTH TO GROUND WATER BETWEEN : 0.0000E+00 AND 1.0000E-02
FIELD CAPACITY FOR TOP SOIL : 9.0000E-02
EFFECTIVE POROSITY BETWEEN : 2.0000E-02 AND 3.0000E-01
SEEPAGE TO GROUNDWATER BETWEEN : 4.6330E+03 AND 1.3900E+04 CM/MONTH
DISTANCE TO DRINKING WELL : 2.7000E+04 CM

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U.S. CITY
==========

MENU: Geodata Handling Data List procedures

1. Site level retrieval of data (SITERET)
2. Access Census Data (CENSUS)
3. Determine County Coverage (COVERAGE)
4. Geographic Data Management (GEODM)
5. HUCODE/SOIL locator (HUCODE)
6. Convert to Lat/Long (LATLON)
7. Lookup/Examine Star Station Data (STAR)
8. Find US cities (USCITY)
9. Find Soil Survey Status of Counties (SSURVEY)

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or a command: HELP, HELP option, BACK, CLEAR, EXIT, TUTOR
GEMS>

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or a command: HELP, HELP option, BACK, CLEAR, EXIT, TUTOR
GEMS> CLEAR

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1.  Estimation                                              (ES)
2.  Modeling                                                (MO)
3.  Geodata Handling                                        (GH)
4.  File Management                                         (FM)
5.  Statistics                                              (ST)
6.  Graphics                                                (GR)
7.  Utilities                                               (UT)
8.  Information and News                                    (IN)

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GEMS>

Enter an option number or a procedure name (in parentheses
or a command: HELP, HELP option, BACK, CLEAR, EXIT, TUTOR
GEMS> EXIT

Type YES to confirm the EXIT command; type NO to restart GEMS
GEMS> YES
$
$ LOGOUT
 WRT          logged out at 15-MAY-1990 10:47:36.48
 Itemized resource charges, for this session, follow:

NODE: VAXFM1
ACCT: NTIS                          START TIME:    15-MAY-1990 10:42:26.72
PROJ: NTISNUCN                      FINISH TIME:   15-MAY-1990 10:47:36.48
USER: WRT                           BILLING PERIOD:900501
UIC:  [000750,000112]               WEEKDAY:       TUESDAY
BAUD:                               TERMINAL PORT: VTA365

DESCRIPTION OF CHARGE                QUANTITY            EXPENDITURE
-----------------------------------------------------------------------

  ALL CHARGE LEVELS
    300  baud           (Seconds)        310                  0.7750
    CPU TIME            (Seconds)          7                  0.4628
                                                         -----------
    TOTAL FOR THIS SESSION                               $     1.2378
NODE 3157  HOST 1038: DROPPED BY HOST
please log in: (

password:
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Reference No. 19

THURSDAY, APRIL 26, 1990, THE MIAMI HERALD

Road plan saves tortoise habitat

By CURTIS MORGAN
Herald Staff Writer

A yearlong debate over a Fort Lauderdale Executive Airport road that threatened a gopher tortoise haven all but ended Wednesday in a compromise as rare as the creature itself.

The solution pleased all sides — environmentalists and business people.

An access road that would have skirted the border of a 15.2-acre ridge of white sand covered with rare rosemary scrub providing a home to lizards, rodents and turtles can be rerouted, airport manager William Crouch Jr. told the Broward County Urban Wilderness Advisory Board on Wednesday night.

Elated board members, who had argued that the original road would have chewed up dunes and grasses that nourish the preserve's

PLEASE SEE GOPHER, 8BR

TURTLE TIDBITS

The gopher tortoise is a land turtle that can live to be 40 years old and grow as long as 14 inches. It is classified by Florida as a "species of special concern." It lives in deep underground sand burrows, which house three dozen species of animals, including the rare Florida gopher frog, the Florida mouse, the threatened Eastern indigo snake, the Florida pine snake and three kinds of beetles.

Other rare species on the site:

- The Florida scrub lizard, a rare reptile with iridescent blue belly scales.
- The large-flowered rosemary, a member of the mint family.
- Curtiss' milkweed, a threatened flowering perennial with leaves that resemble oak leaves.
- Bromeliads, scrub palmetto, spike moss and a variety of lichens.

Compromise road plan saves habitat of turtles

GOPHER, FROM 1BR

turtles, endorsed the design.

"You're talking about the environmental community and government and the private sector getting together to work out a solution," said David Utley, the board's vice chairman.

Airport authorities want the road to lead from Cypress Creek Road to an operations center, cargo gates and U.S. Customs Service office that will be built on the airport's north side. It also would improve access for emergency vehicles.

The road would have run about 600 feet north of the east-west runway, behind the Allied Signal Aerospace complex parallel to Cypress Creek Road. Under the original design, a section would have reached 50 feet into the preserve.

In May, over environmentalists' objections, the Fort Lauderdale City Commission approved the route but asked airport officials to continue to seek a compromise.

It came when Allied Signal agreed to allow the road to be built farther east in six acres it plans to develop. City engineers and airport staffers drew up a new design that actually will expand the turtle territory.

NUS CORPORATION A **TELECON NOTE**

Reference No. 20

CONTROL NO.	DATE: May 3, 1990	TIME: 11:40 AM

DISTRIBUTION:

Broward County Project Managers

BETWEEN: Paddy Cunningham	OF: Fern Forest Nature Center	PHONE: (305) 970-0150

AND: William E. Vasser, NUS Corporation

DISCUSSION:

Fern Forest Nature Center is a 254-acre regional park. It is home to 32 species of ferns, including the hand adder's tounge fern (Ophioglossum palmatum), a state-designated endangered species. Also, the threatened (federal designation) Eastern Indigo snake may be found in the park.

The park is located in the Margate Estates area, northwest of F.L.E.A.

Reference No. 21

Official Lists of Endangered and Potentially Endangered Fauna and Flora in Florida

1 July 1988

FLORIDA GAME AND FRESH WATER FISH COMMISSION

Compiled by Don A. Wood, Endangered Species Coordinator

Florida Game and Fresh Water Fish Commission

Scientific Name(s)	Common Name	Designated status[1] FGFWFC[2]	FDA[3]	USFWS[4]	CITES[5]
	VERTEBRATES				
Fish					
Acipenser brevirostrum	Shortnose sturgeon	E		E	I
Acipenser oxyrhynchus	Atlantic sturgeon	SSC		UR2	II
Ammocrypta asprella	Crystal darter	T		UR2	
Centropomus undecimalis	Common snook	SSC			
Cyprinodon variegatus hubbsi	Lake Eustis pupfish	SSC			
Etheostoma histrio	Harlequin darter	SSC			
Etheostoma okaloosae	Okaloosa darter	E		E	
Etheostoma olmstedi maculaticeps	Southern tessellated darter	SSC			
Fundulus jenkinsi	Saltmarsh topminnow	SSC			
Menidia conchorum	Key silverside	T			
Micropterus notius	Suwannee bass	SSC			
Micropterus sp. (undescribed)	Shoal bass	SSC			
Notropis callitaenia	Bluestripe shiner	SSC		UR2	
Notropis sp. (undescribed)	Blackmouth shiner	E		UR2	
Rivulus marmoratus	Rivulus	SSC			
Starksia starcki	Key blenny	SSC			
Amphibians and Reptiles					
Alligator mississippiensis	American alligator	SSC		T(S/A)	II
Ambystoma cingulatum	Flatwoods salamander			UR2	
Caretta caretta caretta	Atlantic loggerhead turtle	T		T	I
Chelonia mydas mydas	Atlantic green turtle	E		E	I
Chrysemys (=Pseudemys) concinna suwanniensis	Suwannee cooter	SSC		UR5	
Crocodylus acutus	American crocodile	E		E	I
Dermochelys coriacea	Leatherback turtle	E		E	I
Diadophis punctatus acricus	Big Pine Key ringneck snake	T		UR2	
Drymarchon corais couperi	Eastern indigo snake	T		T	
Elaphe guttata guttata	Red rat snake	SSC*			
Eretmochelys imbricata imbricata	Atlantic hawksbill turtle	E		E	I
Eumeces egregius egregius	Florida Keys mole skink	SSC		UR2	
Eumeces egregius lividus	Blue-tailed mole skink	T		T	
Gopherus polyphemus	Gopher tortoise	SSC		UR2	
Graptemys barbouri	Barbour's map turtle	SSC		UR2	
Haideotriton wallacei	Georgia blind salamander	SSC		UR2	
Hyla andersonii	Pine Barrens treefrog	SSC			
Kinosternon bauri	Striped mud turtle	E*		UR2	
Lepidochelys kempi	Atlantic ridley turtle	E		E	I
Macroclemys temmincki	Alligator snapping turtle	SSC		UR2	
Neoseps reynoldsi	Sand skink	T		T	
Nerodia fasciata taeniata	Atlantic salt marsh water snake	T		T	
Pituophis melanoleucus mugitus	Florida pine snake	SSC		UR2	
Pseudobranchus striatus lustricolus	Gulf hammock dwarf siren			UR2	
Rana areolata	Gopher frog	SSC		UR2	
Rana okaloosae	Bog frog	SSC			
Sceloporus woodi	Florida scrub lizard			UR2	
Stilosoma extenuatum	Short-tailed snake	T		UR2	
Storeria dekayi victa	Florida brown snake	T*			
Tantilla oolitica	Miami black-headed snake; rimrock crowned snake	T		UR2	
Thamnophis sauritus sackeni	Florida ribbon snake	T*			

*Applicable in lower Florida Keys only

Scientific Name(s)	Common Name	FGFWFC	FDA	USFWS	CITES
Birds					
Aimophila aestivalis	Bachman's sparrow			UR2	
Ajaia ajaja	Roseate spoonbill	SSC			
Ammodramus maritimus juncicolus	Wakulla seaside sparrow	SSC		UR2	
Ammodramus maritimus mirabilis	Cape Sable seaside sparrow	E		E	
Ammodramus maritimus nigrescens	Dusky seaside sparrow	E		E	
Ammodramus maritimus pelonotus	Smyrna seaside sparrow			UR2	
Ammodramus maritimus peninsulae	Scott's seaside sparrow	SSC			
Ammodramus savannarum floridanus	Florida grasshopper sparrow	E		E	
Aphelocoma coerulescens coerulescens	Florida scrub jay	T		T	
Aramus guarauna	Limpkin	SSC			

Scientific Name(s)	Common Name	Designated status[1] FGFWFC[2]	FDA[3]	USFWS[4]	CITES[5]
Vanilla phaeantha	Leafy vanilla; oblong-leaved vanilla		T		II
Vanilla planifolia	Commercial vanilla		T		II
Veratrum woodii	Woods' false hellebore		E		
Verbena maritima	Coastal vervain			UR2	
Verbena tampensis	Tampa vervain			UR1	
Verbesina chapmanii	Chapman's crownbeard		T	UR2	
Verbesina heterophylla	Variable-leaf crownbeard; North Florida crownbeard			UR1	
Vicia ocalensis	Ocala vetch		E	UR1	
Viola hastata	Halberd-leaved yellow violet		E		
Vittaria lineata	Shoestring fern		T		
Warea amplexifolia	Clasping warea; wide-leaf warea		E	E	
Warea carteri	Carter's mustard		E	E	
Warea sessilifolia	Sessile-leaved warea			UR5	
Woodsia obtusa	Blunt-lobed woodsia		T		
Woodwardia areolata	Netted chain fern		T		
Xyris drummondii	Drummond's yellow-eyed grass			UR2	
Xyris isoetifolia	Quillwort yellow-eyed grass; panhandle yellow-eyed grass			UR2	
Xyris longisepala	Karst pond yellow-eyed grass; Kral's yellow-eyed grass		E	UR5	
Xyris scabrifolia	Harper's yellow-eyed grass; harsh-leaf yellow-eyed grass		T	UR2	
Zamia floridana	Florida coontie		C		II
Zamia integrifolia	Florida arrowroot		C	UR5	II
Zamia umbrosa	East Coast coontie		C		II
Zanthoxylum flavum	Yellowheart		E		
Zephyranthes (all white species)	Rain lilies		T		
Zephyranthes simpsonii	Simpson zephyr lily		E	UR5	
Zephyranthes treatiae	Rain lily (unnamed)			UR5	
Zizia latifolia	Bristol golden alexander			UR2	
Ziziphus celata	Florida jujube			UR2	

[1]E = Endangered
T = Threatened
T(S/A) = Threatened Due to Similarity of Appearance
SSC = Species of Special Concern
C = Commercially Exploited
I = Appendix I Species
II = Appendix II Species
UR1 = Under review for federal listing, with substantial evidence in existence indicating at least some degree of biological vulnerability and/or threat.
UR2 = Under review for listing, but substantial evidence of biological vulnerability and/or threat is lacking.
UR3 = Still formally under review for listing, but no longer being cosidered for listing due to existing pervasive evidence of extinction.
UR4 = Still formally under review for listing, but no longer being considered for listing because current taxonomic understanding indicates species in an invalid taxon and thus ineligible for listing.
UR5 = Still formally under review for listing, but no longer considered for listing because recent information indicates species is more widespread or abundant than previously believed.

[2]Florida Game and Fresh Water Fish Commission (list published in Section 39-27.003-005, Florida Administrative Code).

[3]Florida Department of Agriculture and Consumer Servicees (list published in Preservation of Native Flora of Florida Act, Section 581.185-187, Florida Statutes).

[4]United States Fish and Wildlife Service (list published in List of Endangered and Threatened Wildlife and Plants, 50 CFR 17.11-12).

[5]Convention on International Trade in Endangered Species of Wild Fauna and Floras.

Rare and Endangered Biota of Florida
Peter C. H. Pritchard, SERIES EDITOR

Reference No. 22

Volume Five

PLANTS

Edited by Daniel B. Ward

Chairman, Special Committee on Plants
FLORIDA COMMITTEE ON RARE AND ENDANGERED PLANTS AND ANIMALS

Sponsored by the FLORIDA AUDUBON SOCIETY and FLORIDA DEFENDERS OF THE ENVIRONMENT
in cooperation with the STATE OF FLORIDA GAME AND FRESH WATER FISH COMMISSION

Published for the FLORIDA COOPERATIVE EXTENSION SERVICE, INSTITUTE OF FOOD AND AGRICULTURAL SCIENCES, UNIVERSITY OF FLORIDA

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(1978)

Table 1. Distribution of listed plants by county. E = listed as Endangered. T = listed as Threatened. R = listed as Rare. ? = uncertainty; part or all of the county is shown as occurring within the range, but no specific county records are known, or the species is believed to be no longer present in the county.

ALACHUA

Adiantum capillus-veneris (R)
Asplenium pumilum (E)
Blechnum occidentale (E)
Brickellia cordifolia (R)
Callirhoe papaver (T)
Cheilanthes microphylla (R)
? *Litsea aestivalis* (R)
Malaxis unifolia (R)
Peltandra sagittifolia (R)
Polygonum meisnerianum (R)
Rhapidophyllum hystrix (T)
Smilax smallii (T)
Zamia floridana (T)

BAKER

Harturightia floridana (R)
Linum westii (R)
? *Peltandra sagittifolia* (R)
? *Smilax smallii* (T)
Sphenostigma coelestinum (T)

BAY

? *Adiantum capillus-veneris* (R)
Drosera intermedia (R)
Gentiana pennelliana (T)
Hedeoma graveolens (T)
Hypericum lissophloeus (E)
Lupinus westianus (T)
Macbridea alba (E)
Oxypolis greenmanii (E)
Polygonella macrophylla (E)
Rhexia salicifolia (R)
? *Rhododendron austrinum* (T)
Sarracenia leucophylla (T)
Sarracenia rubra (R)
? *Smilax smallii* (T)
? *Stewartia malacodendron* (T)
Verbesina chapmanii (T)
Xyris longisepala (T)

BRADFORD

? *Adiantum capillus-veneris* (R)
? *Litsea aestivalis* (R)
? *Peltandra sagittifolia* (R)
? *Smilax smallii* (T)
Sphenostigma coelestinum (T)

BREVARD

Asclepias curtissii (T)
Ernodea littoralis (T)
Mallotonia gnaphalodes (T)

BREVARD (Cont.)

? *Monotropsis reynoldsiae* (E)
Nemastylis floridana (T)
? *Nolina atopocarpa* (E)
Ophioglossum palmatum (E)
Rhapidophyllum hystrix (T)
Zamia umbrosa (T)

BROWARD

Asplenium dentatum (T)
Asplenium serratum (E)
Coccothrinax argentata (T)
Commelina gigas (T)
Drosera intermedia (R)
Ernodea littoralis (T)
? *Gossypium hirsutum* (E)
Jacquemontia reclinata (E)
Mallotonia gnaphalodes (T)
Nemastylis floridana (T)
Okenia hypogaea (E)
Ophioglossum palmatum (E)
Pleopeltis revoluta (E)
Polygala smallii (E)
? *Remirea maritima* (E)
Tillandsia flexuosa (T)
Zamia floridana (T)

CALHOUN

Adiantum capillus-veneris (R)
Baptisia megacarpa (E)
? *Bumelia lycioides* (R)
Cornus alternifolia (E)
Drosera intermedia (R)
Gentiana pennelliana (T)
Kalmia latifolia (R)
Linum westii (R)
Oxypolis greenmanii (E)
Rhododendron austrinum (T)
Sarracenia leucophylla (T)
Smilax smallii (T)
Stewartia malacodendron (T)

CHARLOTTE

? *Asclepias curtissii* (T)
? *Ernodea littoralis* (T)
? *Gossypium hirsutum* (E)
Zamia floridana (T)

CITRUS

Adiantum capillus-veneris (R)
Anemone berlandieri (R)

CITRUS (Cont.)

Asplenium pumilum (E)
Cheilanthes microphylla (R)
? *Drosera intermedia* (R)
? *Peltandra sagittifolia* (R)
Rhapidophyllum hystrix (T)
Smilax smallii (T)
Zamia floridana (T)

CLAY

Asclepias curtissii (T)
Harturightia floridana (R)
Litsea aestivalis (R)
Peltandra sagittifolia (R)
Rhapidophyllum hystrix (T)
Rhododendron chapmanii (E)
Rudbeckia nitida (T)
? *Smilax smallii* (T)
Sphenostigma coelestinum (T)

COLLIER

Acrostichum aureum (R)
Asclepias curtissii (T)
Asplenium auritum (E)
Asplenium serratum (E)
Bulbophyllum pachyrhachis (E)
Burmannia flava (R)
Campylocentrum pachyrrhizum (E)
Campyloneurum angustifolium (E)
Catopsis nutans (E)
Celtis iguanaea (E)
Cereus gracilis (T)
Cheilanthes microphylla (R)
Encyclia pygmaea (E)
Epidendrum acunae (E)
Epidendrum nocturnum (T)
Ernodea littoralis (T)
? *Gossypium hirsutum* (E)
? *Guzmania monostachia* (E)
Jacquemontia curtissii (T)
Lepanthopsis melanantha (R)
Lycopodium dichotomum (E)
Maxillaria crassifolia (E)
Ophioglossum palmatum (E)
Restrepiella ophiocephala (E)
Roystonea elata (R)
Tillandsia flexuosa (T)
Tillandsia pruinosa (T)

COLUMBIA

Adiantum capillus-veneris (R)
Litsea aestivalis (R)
Peltandra sagittifolia (R)

SELECTED REFERENCES:

Small, J. K. 1938. Ferns of the Southeastern States. Lancaster, Pa. 517 pp.

PREPARED BY: Daniel B. Ward and Robert K. Godfrey.

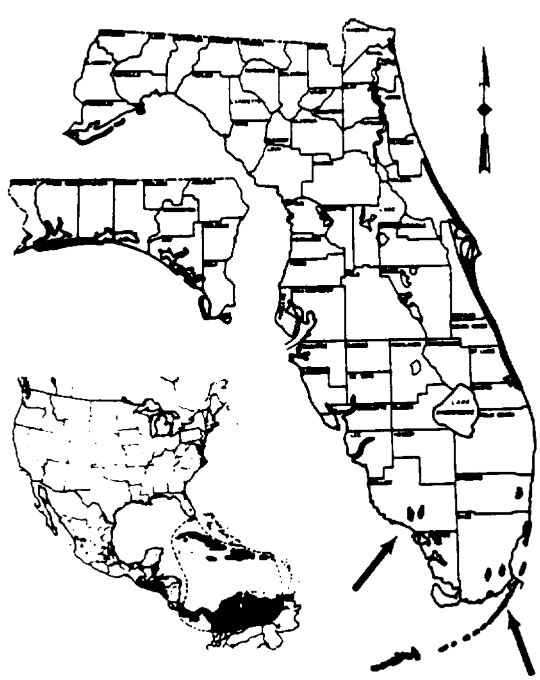
Endangered
BIRD'S-NEST SPLEENWORT

Asplenium serratum **L.**
Polypodiaceae
Filicinae

OTHER NAMES: New World Bird's-nest Fern.

DESCRIPTION: The Bird's-nest Spleenwort is a fern with an upright rootstock surmounted by a vase-shaped rosette of leaves, suggesting the form of a bird's nest. Each leaf is oblanceolate, undivided, with the margin rather evenly toothed. On large plants the leaves may be up to 70 or 80 cm long. From the midrib a multitude of straight, closely spaced veins run almost directly to the margin, each ending in a separate tooth. The sori are linear and lie directly on the surface of the veins but do not extend fully to the margins.

RANGE: This is a tropical fern, widespread in the West Indies and Central and South America. In Florida it is probably found at present only in Monroe, Dade, Broward, and Collier counties. Specimens collected in April 1877 by A. P. Garber, the discoverer of this species in the United States, were recorded as having been obtained at Miami; possibly his location was Matheson Hammock, where the species was formerly abundant. Correll (1938) has cited specimens from Lee and Volusia counties, areas from which it has long been extirpated.



Bird's-nest Spleenwort (*Asplenium serratum*)

HABITAT: The characteristic sites of this fern are on fallen logs, on stumps, or near the bases of tree trunks in the deep swamps of the Fakahatchee Slough, in the Deep Lake cypress strand, and in the somewhat drier but still dark and moist tropical hammocks.

SPECIALIZED OR UNIQUE CHARACTERISTICS: The genus *Asplenium* is a large one, and most species have pinnate or even bipinnate leaves. The Bird's-nest Spleenwort stands out because of its undivided leaves with the many parallel veins, but in other characteristics it is typical of the genus.

BASIS OF STATUS CLASSIFICATION: This plant has horticultural appeal and has become a target of the hordes of amateur and even commercial collectors, who gather it for greenhouse and patio ornamentation. The Matheson Hammock station, where Small (1921) said there was more of this fern than in all the other South Florida hammocks together, is now largely depleted by this rapacious collecting. The surviving stations are largely protected by distance and inaccessibility.

RECOMMENDATIONS: This fern is presently given token protection, as are most ferns, by its inclusion (even though not specifically listed) in the Preservation of Native Flora Law. Since it is a particularly attractive plant for greenhouse cultivation, however, it is regularly taken from the wild by horticulturists. This collecting, more than habitat destruction, has now made it a very rare plant. Matheson Hammock, presently owned and protected by Dade County, still retains a few plants and, if closer control of collection cannot be established in the Collier County cypress swamps, will soon be the only surviving station for the species in the United States.

SELECTED REFERENCES:

Correll, D. S. 1938. A county check-list of Florida ferns and fern allies. Amer. Fern Jour. 28:11–16, 46–54, 91–100.

Small, J. K. 1921. Historic trails, by land and by water. Jour. N.Y. Bot. Gard. 22:193–222.

PREPARED BY: Daniel B. Ward.

Endangered
APALACHICOLA WILD-INDIGO

Baptisia megacarpa **Chapm.**
Leguminosae
Dicotyledoneae

DESCRIPTION: The Apalachicola Wild-indigo is a perennial herb, to about 8–10 dm tall. The stems are spar-

RANGE: The Burrowing Four-o'clock is known in Florida only from a few locations along the lower east coast. Elsewhere it is found only along the Gulf Coast of Mexico, from Veracruz to Yucatán.

HABITAT: The habitat of this plant is restricted to the ocean side of the coastal dunes. It is often the closest plant to the water's edge.

SPECIALIZED OR UNIQUE CHARACTERISTICS: This plant is almost unique in that it buries its developing fruit beneath the soil as does the Peanut (*Arachis hypogaea*). The specific epithet for both of these plants is derived from words meaning "beneath the ground." Other than for this developmental trait, the two plants are not related. The subterranean fruit ensures that the seeds are well placed in a suitable habitat for germination and growth, but at the same time inhibits the ease with which this plant is distributed.

BASIS OF STATUS CLASSIFICATION: J. K. Small and J. J. Carter discovered *Okenia hypogaea* in 1903 on the sand dunes opposite Miami, a site now wholly destroyed by hotel construction. Small later (1919) reported that it extended from Soldier Key, north to Baker's Haulover, Dade County. It was then found farther north, to Juno Beach, northern Palm Beach County. Most of the stations once known along this coast have been obliterated by construction and by dune removal, and increasing recreational use of beach areas imperils even those plants in state-owned parks.

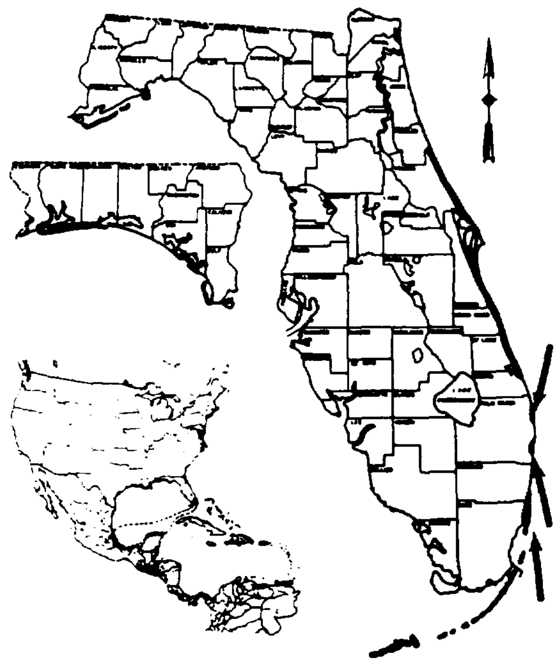
Fig. 27. Burrowing Four-o'clock (*Okenia hypogaea*): Flowering branch X 2/5; habit X 1/8.

RECOMMENDATIONS: All possible remaining areas of beach dunes on which the Burrowing Four-o'clock occurs should be protected from development. Those areas in state parks should be protected by steps to guide public pathways and heavy usage away from the dunes where this plant grows.

SELECTED REFERENCES:

Small, J. K. 1919. *Okenia hypogaea*. Addisonia 4:11–12.

PREPARED BY: Daniel B. Ward.



Burrowing Four-o'clock (*Okenia hypogaea*)

Endangered
HAND FERN

Ophioglossum palmatum L.
Ophioglossaceae
Filicinae

OTHER NAMES:
Scientific synonym: *Cheiroglossa palmata* (L.) Presl

DESCRIPTION: The Hand Fern is not readily recognized by the novice as belonging to that plant group. It consists of a scaly, globose rhizome from which hang usually 2 or 3 pendent leaves, each consisting of a fleshy but flat "hand"-shaped blade. These leaves may have anywhere from 2 to 6 or 7 elongate, usually sharp-tipped lobes, the "fingers." The leaf with its long petiole may droop 40 cm below the attachment of the rhizome. The spore-bearing structures are attached near the juncture of the blade with its petiole;

these are narrowly oblong, 1–6 in number, and 3–5 cm long.

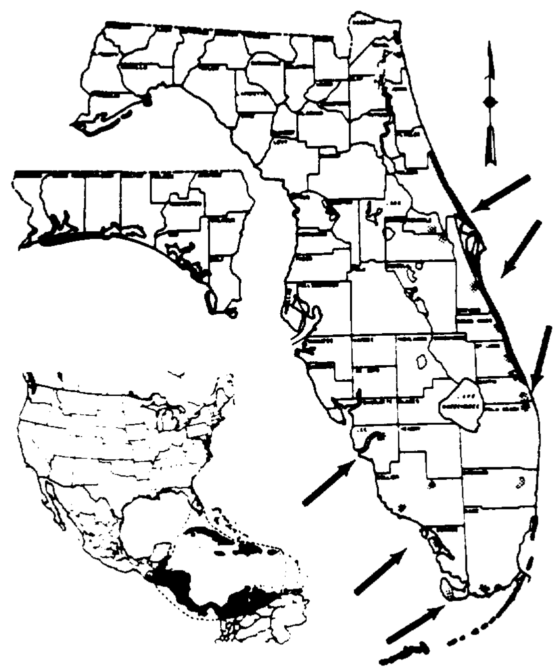
RANGE: This is a tropical fern, once found throughout the West Indies and the tropical portions of Central and South America. In Florida it once was locally common in the southern part of the peninsula and extended north to Manatee County on the West Coast and Seminole and Orange counties in the east. It is now found only in a few low hammocks.

HABITAT: The almost exclusive habitat of this fern is the detritus-filled base or "boot" of Cabbage Palm trees (*Sabal palmetto*) in low, moist, and very shaded hammocks. As the leaves sequentially die, decay, and fall from the trunk, a process that takes a number of years, the Hand Ferns germinate, thrive, and then, with the boot, fall to the ground where they too die.

SPECIALIZED OR UNIQUE CHARACTERISTICS: The form of this plant, with its hand-shaped, pendent leaves, is like no other in Florida.

BASIS OF STATUS CLASSIFICATION: The range of this bizarre plant has dwindled under the twin assaults of drainage and fire and of the rapacious enthusiasm of collectors. In 1938 J. K. Small wrote: "The plants are very sensitive to fire, and since forest-fires and prairie-fires are becoming more frequent in districts where they formerly were rare, this fern is fast disappearing from localities where it once was abundant. So destructive have been the fires that in many localities where comparatively few years ago the Hand Fern could be gathered literally by the wagon load it is now extinct. The few stations now known to fern students are guarded with great secrecy."

The three and a half decades that have passed since Small's statement have carried the Hand Fern very much closer to the point of its total disappearance from Florida. The vastly increased population of South Florida, with the more-than-proportional increase in the number of persons interested in collecting and raising our rarer native plants, has meant the destruction of the last remnant of this fern from areas where, even when Small wrote, it was still common. In a single documented example—when the trail through Mahogany Hammock in the Everglades National Park was opened in April 1960—three trees in the hammock were known to bear Hand Fern; by June of that year there was none.



Hand Fern (*Ophioglossum palmatum*)

Fig. 28. Hand Fern (*Ophioglossum palmatum*): Fertile lobe X 3/2; habit X 1/2.

RECOMMENDATIONS: The habitat in which the Hand Fern once grew is not yet absent from South Florida, for it is often poorly drained and ill adapted to development. But those places where this fern still occurs must be protected from fire and increasingly from the depredations of collectors. Without effective restrictions to its collection, the Hand Fern will not long persist in Florida.

SELECTED REFERENCES:

Mesler, M. R. 1974. The natural history of *Ophioglossum palmatum* in South Florida. Amer. Fern Jour. 64:33–39.

SELECTED REFERENCES:

Harper, R. M. 1950. A preliminary list of the endemic flowering plants of Florida. Quart. Jour. Fla. Acad. Sci. 12:1–19.

Ward, D. B. 1963. Southern limit of *Chamaecyparis thyoides*. Rhodora 65:359–363.

Wherry, E. T. 1936. The ranges of our eastern Parnassias and Sedums. Bartonia 17:17–20.

PREPARED BY: Daniel B. Ward.

Endangered
EVERGLADES PEPEROMIA

Peperomia floridana Small
Piperaceae
Dicotyledoneae

OTHER NAMES:
Scientific synonym: *Rhynchophorum floridanum* (Small) Small

DESCRIPTION: The Everglades Peperomia is an epiphyte. The stems are stout, with the branches elongated and often vine-like. The leaves are ovate to orbicular, 5–10 cm long, and narrowed to a short petiole. The inflorescence is a short-stalked spike usually 6–10 cm long, with the rachis up to 5 mm thick.

RANGE: This species is endemic to South Florida, mostly or perhaps entirely in Dade County.

HABITAT: The plant is epiphytic, mainly on the trunks of oak trees in hammocks.

SPECIALIZED OR UNIQUE CHARACTERISTICS: This is one of the two species of Florida *Peperomia* that are epiphytic. The other, *Peperomia obtusifolia* (L.) Dietr., is usually restricted to decaying bark of logs and stumps and is seldom found far above the ground. The Everglades Peperomia prefers the sound bark of living wood and often occurs far above the ground in the upper branches of the trees. It is unusually attractive growing in combination with ferns, orchids, and bromeliads.

BASIS OF STATUS CLASSIFICATION: In 1926 J. K. Small described this plant as apparent "upon entering any hammock of the Everglades Keys." Now only a few surviving hammocks contain plants of this species.

RECOMMENDATIONS: This plant may be preserved only by protection of the few surviving hammocks where it is still to be found.

SELECTED REFERENCES:

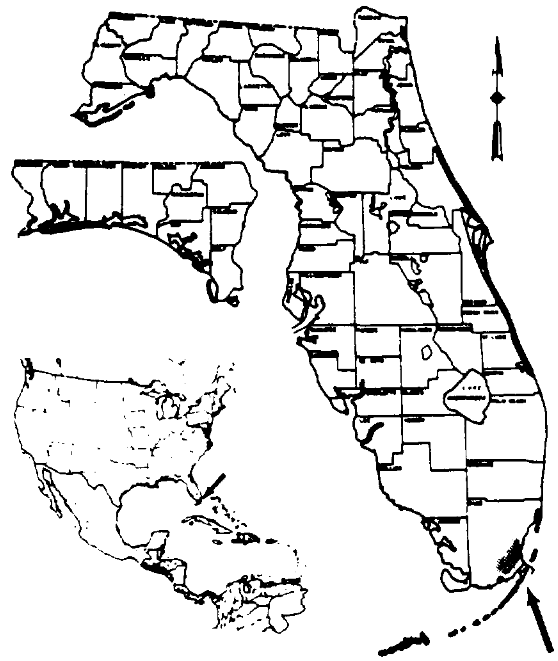
Long, R. W. and O. Lakela. 1971. A Flora of Tropical Florida. Univ. of Miami Press. Coral Gables, Fla. 962 pp.

Small, J. K. 1926. An additional species of *Peperomia* from Florida. Torreya 26:109–110.

Small, J. K. 1931. The wild pepper-plants of continental United States. Jour. N.Y. Bot. Gard. 32:210–223.

Small, J. K. 1933. Manual of the Southeastern Flora. N.Y. 1554 pp.

PREPARED BY: John Popenoe.



Everglades Peperomia (*Peperomia floridana*)

Endangered
STAR-SCALE FERN

Pleopeltis revoluta (Spreng. ex Willd.) A. R. Smith
Polypodiaceae
Filicinae

OTHER NAMES:
Scientific synonyms: *Pleopeltis astrolepis* (Liebm.) Fourn.; *Polypodium astrolepis* Liebm.

DESCRIPTION: Star-scale Fern is a small epiphytic fern. Its rhizome is a dark brown, slender strand, about 2 mm in diameter, creeping and branching extensively on its host tree. The rhizome is covered with long, dense, rusty brown hairs that almost conceal small, blackish scales. The fronds are scattered, with very short stipes that are quickly margined and broaden into a linear or lance-linear blade from 6 to 15 cm long and 5 to 15 mm broad. On the lower leaf surface, on either side of the midrib, is a single row of circular or, more generally, oblong sori. Protruding among the sporangia of the sorus are special protective hairs, or

M.2 - SITE MAINTENANCE FORM

* ACTION: _ *

EPA ID : FLD981029697

SITE NAME: A G PRODUCTS INC   SOURCE: R * ____ _ *

STREET : 810 NW 57 CT   CONG DIST: 12 * ____ __ *

CITY : FT LAUDERDALE   ZIP: 33309 * ____ ____-____ *

CNTY NAME: BROWARD   CNTY CODE : 011 * ____ __ *

LATITUDE : 26/11/36.0   LONGITUDE : 080/10/54.0 * __/__/__._ __/__/__._ *

LL-SOURCE: R   LL-ACCURACY: * _ _ *

SMSA : 2680   HYDRO UNIT: 03090202 * ____ ________ *

INVENTORY IND: Y REMEDIAL IND: Y REMOVAL IND: N FED FAC IND: N * _ _ _ _ *

NPL IND: N   NPL LISTING DATE: NPL DELISTING DATE: * _ __/__ __/__ *

SITE/SPILL IDS: * __ __ __ __ __ *

RPM NAME: RPM PHONE: - - * ____ ___-___-____ *

SITE CLASSIFICATION: SITE APPROACH: * __ __ *

DIOXIN TIER: REG FLD1:   REG FLD2: * ____ ______ _ *

RESP TERM: PENDING ( )   NO FURTHER ACTION ( ) * PENDING (_)   NO FURTHER ACTION (_) *

ENF DISP: NO VIABLE RESP PARTY ( )   VOLUNTARY RESPONSE ( ) * _ _ *
ENFORCED RESPONSE ( )   COST RECOVERY ( ) * _ _ *

SITE DESCRIPTION:

* ____ *
* ____ *
* ____ *
* ____ *

M.2 - PROGRAM MAINTENANCE FORM

* ACTION: _ *

SITE: A G PRODUCTS INC

EPA ID: FLD981029697 PROGRAM CODE: H01 PROGRAM TYPE: * _ *

PROGRAM QUALIFIER: ALIAS LINK : * ___ __ *

PROGRAM NAME: SITE EVALUATION * ______________________________ *

DESCRIPTION:

* ____ *

* ____ *

* ____ *

* ____ *

M.2 - EVENT MAINTENANCE FORM

* ACTION: _ *

SITE: A G PRODUCTS INC
PROGRAM: SITE EVALUATION

EPA ID: FLD981029697 PROGRAM CODE: H01 EVENT TYPE: DS1

FMS CODE: EVENT QUALIFIER : EVENT LEAD: S * _ ___ _ *

EVENT NAME: DISCOVERY STATUS: * ______________________________ _ *

DESCRIPTION:

* ____ *
* ____ *
* ____ *
* ____ *

ORIGINAL	CURRENT	ACTUAL			
START:	START:	START:	* __/__/__	__/__/__	__/__/__ *
COMP :	COMP :	COMP : 06/01/85	* __/__/__	__/__/__	__/__/__ *

HQ COMMENT:

* ____ *

RG COMMENT:

* ____ *

COOP AGR #	AMENDMENT #	STATUS	STATE %				
			0	* __________	__________	__	___ *

M.2 - EVENT MAINTENANCE FORM

* ACTION: _ *

SITE: A G PRODUCTS INC
PROGRAM: SITE EVALUATION

EPA ID: FLD981029697 PROGRAM CODE: H01 EVENT TYPE: PA1

FMS CODE: EVENT QUALIFIER : EVENT LEAD: S * _ ___ _ *

EVENT NAME: PRELIMINARY ASSESSMENT STATUS: * ______________________________ _ *

DESCRIPTION:

* ____ *
* ____ *
* ____ *
* ____ *

ORIGINAL	CURRENT	ACTUAL			
START:	START:	START: 10/25/85	* __/__/__	__/__/__	__/__/__ *
COMP :	COMP :	COMP : 10/30/85	* __/__/__	__/__/__	__/__/__ *

HQ COMMENT:

* ____ *

RG COMMENT:

* ____ *

COOP AGR #	AMENDMENT #	STATUS	STATE %				
			0	* __________	__________	__	___ *

OVERSIZED

DOCUMENTS

MAPS

EPA

POTENTIAL HAZARDOUS WASTE SITE TENTATIVE DISPOSITION

REGION: IV
SITE NUMBER: FLD981029697

File this form in the regional Hazardous Waste Log File and submit a copy to: U.S. Environmental Protection Agency, Site Tracking System, Hazardous Waste Enforcement Task Force (EN-335), 401 M St., SW, Washington, DC 20460.

I. SITE IDENTIFICATION

A. SITE NAME: A.G. Products Inc.	B. STREET: 810 NW 57th Court
C. CITY: Ft. Lauderdale	D. STATE: FL — E. ZIP CODE: 33309

II. TENTATIVE DISPOSITION

Indicate the recommended action(s) and agency(ies) that should be involved by marking 'X' in the appropriate boxes.

RECOMMENDATION	MARK 'X'	ACTION AGENCY: EPA	STATE	LOCAL	PRIVATE
A. NO ACTION NEEDED -- NO HAZARD					
B. INVESTIGATIVE ACTION(S) NEEDED (If yes, complete Section III.)			X		
C. REMEDIAL ACTION NEEDED (If yes, complete Section IV.)					
D. ENFORCEMENT ACTION NEEDED (if yes, specify in Part E whether the case will be primarily managed by the EPA or the State and what type of enforcement action is anticipated.)					

E. RATIONALE FOR DISPOSITION

No hazardous ~~materials~~ waste are handled on-site and the process materials are biodegradable.

F. INDICATE THE ESTIMATED DATE OF FINAL DISPOSITION (mo., day, & yr.)

G. IF A CASE DEVELOPMENT PLAN IS NECESSARY, INDICATE THE ESTIMATED DATE ON WHICH THE PLAN WILL BE DEVELOPED (mo., day, & yr.)

H. PREPARER INFORMATION

1. NAME	2. TELEPHONE NUMBER	3. DATE (mo., day, & yr.)
Denise Bland	257-2234	10/30/85

III. INVESTIGATIVE ACTIVITY NEEDED

A. IDENTIFY ADDITIONAL INFORMATION NEEDED TO ACHIEVE A FINAL DISPOSITION.

Low priority for inspection. Under the Executive Well Field Study

B. PROPOSED INVESTIGATIVE ACTIVITY (Detailed Information)

1. METHOD FOR OBTAINING NEEDED ADDITIONAL INFO.	2. SCHEDULED DATE OF ACTION (mo, day, & yr)	3. TO BE PERFORMED BY (EPA, Contractor, State, etc.)	4. ESTIMATED MANHOURS	5. REMARKS
a. TYPE OF SITE INSPECTION				
(1)				
(2)				
(3)				
b. TYPE OF MONITORING				
(1)				
(2)				
c. TYPE OF SAMPLING				
(1)				
(2)				

Continued From Front

III. INVESTIGATIVE ACTIVITY NEEDED and PART B - PROPOSED INVESTIGATIVE ACTIVITY (Continued)

d. TYPE OF LAB ANALYSIS				
(1)				
(2)				
e. OTHER (specify)				
(1)				
(2)				

C. ELABORATE ON ANY OF THE INFORMATION PROVIDED IN PART B (on front & above) AS NEEDED TO IDENTIFY ADDITIONAL INVESTIGATIVE WORK.

D. ESTIMATED MANHOURS BY ACTION AGENCY

1. ACTION AGENCY	2. TOTAL ESTIMATED MANHOURS FOR INVESTIGATIVE ACTIVITIES	1. ACTION AGENCY	2. TOTAL ESTIMATED MANHOURS FOR INVESTIGATIVE ACTIVITIES
a. EPA		b. STATE	
c. EPA CONTRACTOR		d. OTHER (specify)	

IV. REMEDIAL ACTIONS

A. SHORT TERM/EMERGENCY STRATEGY (On Site & Off-Site) List all emergency actions needed to bring site under immediate control, e.g., restrict access, provide alternate water supply, etc. See instructions for a list of Key Words for each of the actions to be used in the space below.

1. ACTION	2. EST. START DATE (mo,day,& yr)	3. EST. END DATE (mo,day,& yr)	4. ACTION AGENCY (EPA, State, Private Party)	5. ESTIMATED COST	6. SPECIFY 311 OR OTHER ACTION; INDICATE THE MAGNITUDE OF THE WORK REQUIRED
				$	
				$	
				$	
				$	
				$	
				$	

B. LONG TERM STRATEGY (On Site & Off-Site) List all long term solutions, e.g., excavation, removal, ground water monitoring wells, etc. See instructions for a list of Key Words for each of the actions to be used in the spaces below.

1. ACTION	2. EST. START DATE (mo,day,& yr)	3. EST. END DATE (mo,day,& yr)	4. ACTION AGENCY (EPA, State Private Party)	5. ESTIMATED COST	6. SPECIFY 311 OR OTHER ACTION; INDICATE THE MAGNITUDE OF THE WORK REQUIRED
				$	
				$	
				$	
				$	
				$	
				$	

C. ESTIMATED MANHOURS AND COST BY ACTION AGENCY

1. ACTION AGENCY	2. TOTAL EST. MANHOURS FOR REMEDIAL ACTIVITIES	3. TOTAL EST. COST FOR REMEDIAL ACTIVITIES	1. ACTION AGENCY	2. TOTAL EST. MANHOURS FOR REMEDIAL ACTIVITIES	3. TOTAL EST. COST FOR REMEDIAL ACTIVITIES
a. EPA			b. STATE		
c. PRIVATE PARTIES			d. OTHER (specify)		

A. G. PRODUCTS, INC.
AKA: ARMOUR GUARD PRODUCTS, INC.
FLD981029697
PRELIMINARY ASSESSMENT

A. SITE DESCRIPTION. A. G. Products, Inc. was located at 810 NW 57th Court, Ft. Lauderdale, Broward County, Florida. The facility blended detergent components and packages and sells the product in 55 gallon drums. The firm moved to 4074 NE 7th Ave., Ft. Lauderdale in 1983.

B. DESCRIPTION OF HAZARDOUS CONDITIONS, INCIDENTS AND PERMIT VIOLATIONS. Available information indicates that the process does not generate any waste sludge and all rinse solutions are used as solvents for the next batch. Scrap drums are picked-up by Southern Drum for recycling. The process materials include non-ionic surfactants (Shell-Neoda 91-8), an emulsifier (Trido x-100), sodium laurel sulfate, Di-ehtyl coconutamid and Tri-sodium phosphate. No hazardous incidents have been reported.

A 1981 site inspection by BCEQCB reported that the drainfield was not working and rinsewater from the operation was allowed to run onto the ground surface.

C. NATURE OF HAZARDOUS MATERIALS. The process materials are reportedly biodegradable.

D. ROUTES OF CONTAMINATION. The likelihood of contamination is remote due to the degradable nature of the wastes.

E. POSSIBLE AFFECTED POPULATION AND RESOURCES. Area residents are provided with drinking water from the city of Ft. Lauderdale Executive/Prospect municipal wellfield. The wellfield draws from the Biscayne aquifer which is a shallow, permeable, sole-source aquifer. The site is located within the zone of influence of the wellfield. However, due to the biodegradable nature of the materials utilized, it is unlikely that any contaminants released to the groundwater would have significant effect upon the Executive/Prospect municipal wellfield.

F. RECOMMENDATIONS AND JUSTIFICATIONS. Since the materials utilized were biodegradable the site does not pose a significant hazard to the population and resources. Therefore, a low priority for inspection is recommended.

EPA

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT
PART 1 - SITE INFORMATION AND ASSESSMENT

I. IDENTIFICATION

01 STATE: FL | 02 SITE NUMBER: D 981029697

II. SITE NAME AND LOCATION

01 SITE NAME *(Legal, common, or descriptive name of site)*: A. G. Products, Inc. (AKA: Armour Guard Products, Inc.)

02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER: 810 NW 57th Court

03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST
Ft. Lauderdale	FL	33309	Broward	011	017

09 COORDINATES — LATITUDE: 26 10 40.0 — LONGITUDE: 080 08 27.0

10 DIRECTIONS TO SITE *(Starting from nearest public road)*

Proceed north from the intersection of Oakland Park Blvd. and NE 6th Ave. in Oakland Park. Continue on NE 6th Avenue to NE 42nd Street and turn right onto NW 8th Ave. The site is on the left.

III. RESPONSIBLE PARTIES

01 OWNER *(If known)*: A. G. Products, Inc.

02 STREET *(Business, mailing, residential)*: 4074 NE 7th Avenue

03 CITY	04 STATE	05 ZIP CODE	06 TELEPHONE NUMBER
Ft. Lauderdale	FL	33444	(305) 564-9001

07 OPERATOR *(If known and different from owner)*: Vic Mecca

08 STREET *(Business, mailing, residential)*: Same

09 CITY	10 STATE	11 ZIP CODE	12 TELEPHONE NUMBER
Same			( ) Same

13 TYPE OF OWNERSHIP *(Check one)*

☒ A. PRIVATE ☐ B. FEDERAL: ______ *(Agency name)* ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL

☐ F. OTHER: ______ *(Specify)* ☐ G. UNKNOWN

14 OWNER/OPERATOR NOTIFICATION ON FILE *(Check all that apply)*

☐ A. RCRA 3001 DATE RECEIVED: __/__/__ (MONTH DAY YEAR) ☐ B. UNCONTROLLED WASTE SITE *(CERCLA 103 c)* DATE RECEIVED: __/__/__ (MONTH DAY YEAR) ☒ C. NONE

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION

☒ YES ☐ NO — DATE 08/19/82 (MONTH DAY YEAR)

BY *(Check all that apply)*: ☐ A. EPA ☐ B. EPA CONTRACTOR ☐ C. STATE ☐ D. OTHER CONTRACTOR ☒ E. LOCAL HEALTH OFFICIAL ☐ F. OTHER: ______ *(Specify)*

See "Attachment A"

CONTRACTOR NAME(S):

02 SITE STATUS *(Check one)*: ☒ A. ACTIVE ☐ B. INACTIVE ☐ C. UNKNOWN

03 YEARS OF OPERATION: Pre-1982 (BEGINNING YEAR) | Present (ENDING YEAR) ☐ UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED

The process materials utilized on-site are reportedly biodegradable and include non-ionic surfactant (Shell-Neoda 91-8), an emulsifier (Tridox-100), sodium laurel sulfate, bi-Ethyl coconutamid and Tri-sodium phosphate.

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION

Since the materials utilized are reportedly biodegradable, the site should not pose a significant hazard to the environment or population.

V. PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION *(Check one. If high or medium is checked, complete Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Incidents)*

☐ A. HIGH *(Inspection required promptly)* ☐ B. MEDIUM *(Inspection required)* ☒ C. LOW *(Inspect on time available basis)* ☐ D. NONE *(No further action needed, complete current disposition form)*

VI. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF *(Agency/Organization)*	03 TELEPHONE NUMBER
Eric Nuzie Eric L Nuzie	Florida DER	(904) 488-0190

04 PERSON RESPONSIBLE FOR ASSESSMENT	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NUMBER	08 DATE
David Troutman	N/A	E.C. Jordan Co.	(904) 656-1293	09/27/85 (MONTH DAY YEAR)

EPA FORM 2070-12 (7-81)

EN

EPA

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
FL	D 981029697

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS NA*

01 PHYSICAL STATES *(Check all that apply)*

- ☐ A. SOLID
- ☐ B. POWDER, FINES
- ☐ C. SLUDGE
- ☐ D. OTHER ________ *(Specify)*
- ☐ E. SLURRY
- ☐ F. LIQUID
- ☐ G. GAS

02 WASTE QUANTITY AT SITE *(Measures of waste quantities must be independent)*

TONS ________

CUBIC YARDS ________

NO. OF DRUMS ________

03 WASTE CHARACTERISTICS *(Check all that apply)*

- ☐ A. TOXIC
- ☐ B. CORROSIVE
- ☐ C. RADIOACTIVE
- ☐ D. PERSISTENT
- ☐ E. SOLUBLE
- ☐ F. INFECTIOUS
- ☐ G. FLAMMABLE
- ☐ H. IGNITABLE
- ☐ I. HIGHLY VOLATILE
- ☐ J. EXPLOSIVE
- ☐ K. REACTIVE
- ☐ L. INCOMPATIBLE
- ☐ M. NOT APPLICABLE

III. WASTE TYPE NA*

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE			
OLW	OILY WASTE			
SOL	SOLVENTS			
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS			
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS			

IV. HAZARDOUS SUBSTANCES *(See Appendix for most frequently cited CAS Numbers)* No hazardous substances are reportedly handled on-site

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION

V. FEEDSTOCKS *(See Appendix for CAS Numbers)* N/A

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION *(Cite specific references, e.g., state files, sample analysis, reports)*

See attached reference list.

EPA FORM 2070-12 (7-81)

* Based upon available information, there is no waste generated. Rinse solutions are used as solvents for the next batch, and scrap drums are picked-up for recycling.

EPA

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE: FL
02 SITE NUMBER: D 981029697

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☐ A. GROUNDWATER CONTAMINATION — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

Remote potential - Based upon available information, no hazardous wastes are handled on-site and the process materials are biodegradable.

01 ☐ B. SURFACE WATER CONTAMINATION — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

Remote potential - Based upon available information, no hazardous wastes are handled on-site and the process materials are biodegradable.

01 ☐ C. CONTAMINATION OF AIR — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

No potential.

01 ☐ D. FIRE/EXPLOSIVE CONDITIONS — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

Remote potential - On-site storage of propane gas could endanger workers and other nearby population.

01 ☐ E. DIRECT CONTACT — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

Remote potential - Based upon available information, no hazardous wastes are handled on-site and the process materials are biodegradable.

01 ☐ F. CONTAMINATION OF SOIL — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 AREA POTENTIALLY AFFECTED: ______ (Acres) 04 NARRATIVE DESCRIPTION

Remote potential- Based upon available information, no hazardous wastes are handled on-site and the process materials are biodegradable.

01 ☐ G. DRINKING WATER CONTAMINATION — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

Remote potential - Based upon available information, no hazardous wastes are handled on-site and the process materials are biodegradable.

01 ☐ H. WORKER EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 WORKERS POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

Remote potential - Based upon available information, no hazardous wastes are handled on-site and the process materials are biodegradable however, on-site storage of propane gas could endanger workers.

01 ☐ I. POPULATION EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

Remote potential - Based upon available information, no hazardous wastes are handled on-site and the process materials are biodegradable.

EPA

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
FL	D981029697

II. HAZARDOUS CONDITIONS AND INCIDENTS *(Continued)*

01 ☐ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED

04 NARRATIVE DESCRIPTION

Remote potential - the process materials are biodegradable and should not significantly damage the plantlife.

01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED

04 NARRATIVE DESCRIPTION *(Include name(s) of species)*

Remote potential - the process materials are biodegradable and should not significantly damage the wildlife.

01 ☐ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED

04 NARRATIVE DESCRIPTION

Remote potential - the process materials are not bioaccumulative; no hazardous materials are handled on-site and the process materials are biodegradable.

01 ☒ M. UNSTABLE CONTAINMENT OF WASTES *(Spills/runoff/standing liquids/leaking drums)* — 02 ☒ OBSERVED (DATE: 1981) ☐ POTENTIAL ☐ ALLEGED

03 POPULATION POTENTIALLY AFFECTED: 1,001-3,000 — 04 NARRATIVE DESCRIPTION

In 1981 BCEQCB reported that the drainfield was not working and that rinsewater was allowed to run onto the ground surface in a paved area.

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED

04 NARRATIVE DESCRIPTION

None reported.

01 ☒ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: ______) ☒ POTENTIAL ☐ ALLEGED

04 NARRATIVE DESCRIPTION

Surface water runoff may enter nearby storm drains.

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED

04 NARRATIVE DESCRIPTION

None reported.

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

None.

III. TOTAL POPULATION POTENTIALLY AFFECTED: 3,000

IV. COMMENTS

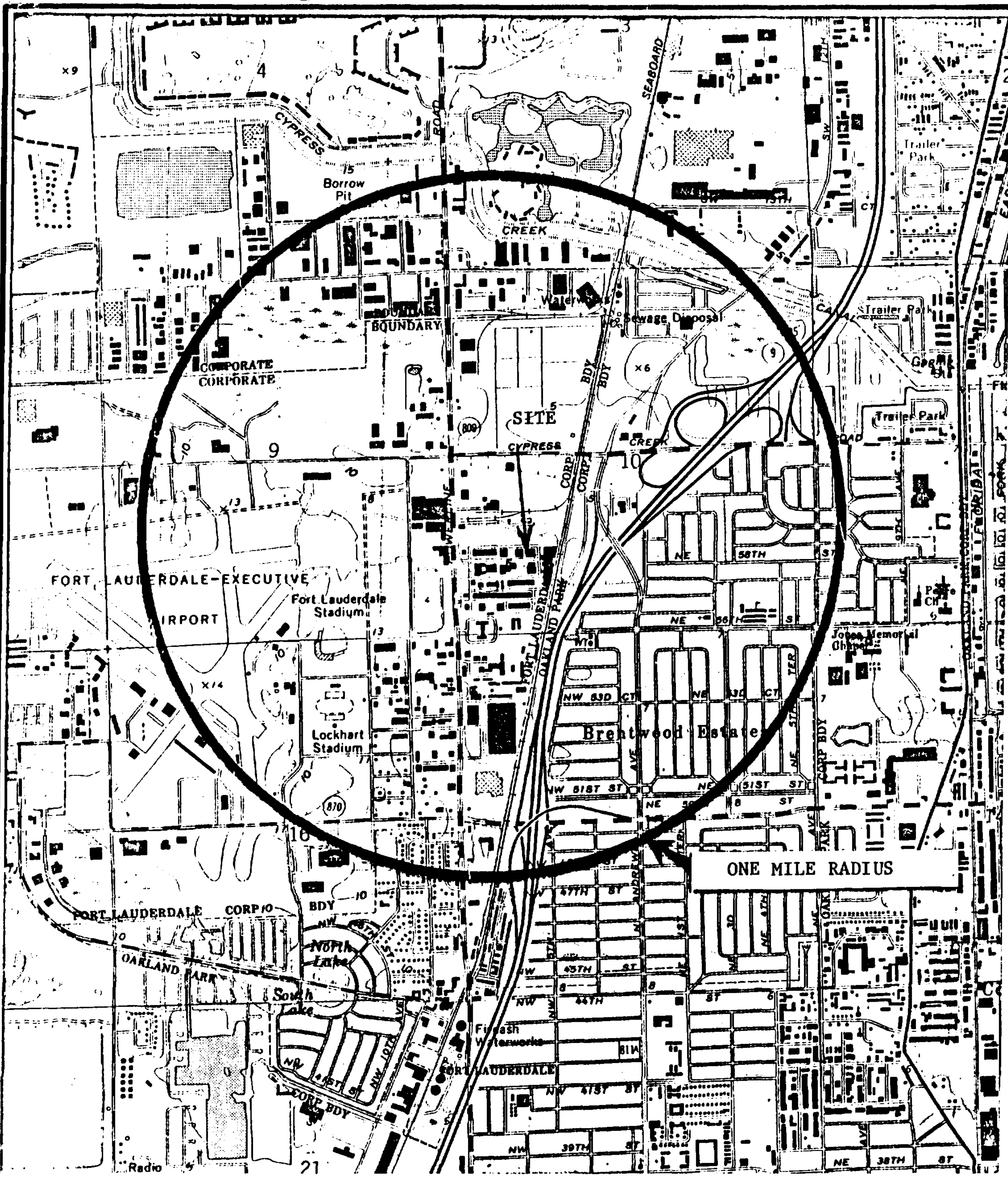
No unstable containment of waste or illegal discharges of waste have been reported since the 1981 report from BCEQCB that the drainfield was not working and the rinsewater was allowed to run onto the ground surface in a paved area of the site.

V. SOURCES OF INFORMATION *(Cite specific references, e.g., state files, sample analysis, reports)*

See attached reference list.

ATTACHMENT A
A.G. PRODUCTS, INC.
ON-SITE INSPECTIONS

DATE	AGENCY	SAMPLES	COMMENTS
8/27/85	E.C. Jordan Co. for FDER	No	Only problem detected was some on-site, covered drums in poor condition
8/19/82 to 4/30/81	BCEQCB	No	No problems detected.



SCALE 1 : 24000

0 1/2 1 MILE

1000 0 1000 2000 FEET

N

FIGURE 1
SITE LOCATION MAP

A.G. PRODUCTS, INC.

BROWARD COUNTY

USGS QUAD Ft. Lauderdale North, FL

DATE 1983

E.C.JORDAN CO

REFERENCE LIST

1. Environmental Protection Agency, Federal Register, National Oil and Hazardous Substances Contingency Plan, Part V, July 16, 1982.

2. Farm Chemicals Handbook, Willoughby, OH; Meister Publishing Company, 1982.

3. Florida Department of Environmental Regulation, The Sites List, Summary Status Report, July 1, 1983 - June 30, 1984.

4. Florida Department of Environmental Regulation, 3012 Folder, 2600 Blairstone Road, Tallahassee, Florida. To be used for completion of Preliminary Assessment, Form 2070-12.

5. Florida Department of Natural Resources, Water Resources of Broward County, Report of Investigation No. 65, 1973.

6. Florida Division of Geology, Chemical Quality of Waters of Broward County, Florida, Report of Investigations No. 51, 1968.

7. Florida Geological Survey, Biscayne Aquifer of Dade and Broward Counties, Florida, Report of Investigation No. 17, 1958.

8. Florida Geological Survey, Groundwater Resources of the Oakland Park Area of Eastern Broward County, Florida, Report of Investigation No. 20, 1959.

9. Health and Safety Plan, Florida 3012 Program, E.C. Jordan Co., June 1984.

10. Healy, Henry G., 1977, Public Water Supplies of Selected Municipalities in Florida, 1975: U.S. Geological Survey, Water-Resources Investigations 77-53, p. 309.

11. NUS Project for Performance of Remedial Response Activities at Uncontrolled Hazardous Substance Facilities--Zone 1. NUS Corporation, Superfund Division.

12. NUS Training Manual, Project for Performance of Remedial Reponse Activities at Uncontrolled Hazardous Substance Facilities--Zone 1, NUS Corporation, Superfund Division.

13. Sax, N. Irving, Dangerous Properties of Industrial Materials, Sixth Edition, Van Nostrand Reinhold Co., 1984.

14. TLVs Threshold Limit Values for Chemical Substances in the Work Environment Adopted by ACGIH for 1983-84, American Conference of Governmental Industrial Hygienists, ISBN: 0-936712-45-7, 1983.

15. U.S. Geological Survey, Topographic Map, 1-24,000 Series.

16. Windholz, M., ed. The Merck Index, an Encyclopedia of Chemicals and Drugs, Rahway, NJ: Merck and Company, Inc., 1976.